FTN
3628

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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/882,639	06/15/2001	Mark Mitchell Kornfein	RD-29,249	2225

7590 10/12/2005

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EXAMINER	
DASS, HARISH T	

ART UNIT	PAPER NUMBER
3628	

DATE MAILED: 10/12/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

PTO-90C (Rev. 10/03)

Office Action Summary	Application No.	Applicant(s)	
	09/882,639	KORNFEIN ET AL.	
	Examiner	Art Unit	
	Harish T. Dass	3628	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *15 June 2001*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-30* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-30* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☒ Other: _____.

DETAILED ACTION

Claim Rejections - 35 USC § 101

1. 35 U.S.C. 101 reads as follows:

> Whoever invents or discovers any new and useful process, machine, manufacture, or composition of matter, or any new and useful improvement thereof, may obtain a patent therefor, subject to the conditions and requirements of this title.

Claims 1-15 are rejected under 35 U.S.C. 101 because the claimed invention is directed to non-statutory subject matter.

As an initial matter, the United States Constitution under Art. I, §8, cl. 8 gave Congress the power to "[p]romote the progress of science and useful arts, by securing for limited times to authors and inventors the exclusive right to their respective writings and discoveries". In carrying out this power, Congress authorized under 35 U.S.C. §101 a grant of a patent to "[w]hoever invents or discovers any new and useful process, machine, manufacture, or composition or matter, or any new and useful improvement thereof." Therefore, a fundamental premise is that a patent is a statutorily created vehicle for Congress to confer an exclusive right to the inventors for "inventions" that promote the progress of "science and the useful arts". The phrase "technological arts" has been created and used by the courts to offer another view of the term "useful arts". See In re Musgrave, 167 USPQ (BNA) 280 (CCPA 1970). Hence, the first test of whether an invention is eligible for a patent is to determine if the invention is within the "technological arts".

Further, despite the express language of §101, several judicially created exceptions have been established to exclude certain subject matter as being patentable subject matter covered by §101. These exceptions include "laws of nature", "natural phenomena", and "abstract ideas". See Diamond v. Diehr, 450, U.S. 175, 185, 209 USPQ (BNA) 1, 7 (1981). However, courts have found that even if an invention incorporates abstract ideas, such as mathematical algorithms, the invention may nevertheless be statutory subject matter if the invention as a whole produces a "useful, concrete and tangible result." See

State Street Bank & Trust Co. v. Signature Financial Group, Inc. 149 F.3d 1368, 1973, 47 USPQ2d (BNA) 1596 (Fed. Cir. 1998).

This "two prong" test was evident when the Court of Customs and Patent Appeals (CCPA) decided an appeal from the Board of Patent Appeals and Interferences (BPAI). See In re Toma, 197 USPQ (BNA) 852 (CCPA 1978). In Toma, the court held that the recited mathematical algorithm did not render the claim as a whole non-statutory using the Freeman-Walter-Abele test as applied to Gottschalk v. Benson, 409 U.S. 63, 175 USPQ (BNA) 673 (1972). Additionally, the court decided separately on the issue of the "technological arts". The court developed a "technological arts" analysis:

The "technological" or "useful" arts inquiry must focus on whether the claimed subject matter...is statutory, not on whether the product of the claimed subject matter...is statutory, not on whether the prior art which the claimed subject matter purports to replace...is statutory, and not on whether the claimed subject matter is presently perceived to be an improvement over the prior art, e.g., whether it "enhances" the operation of a machine. In re Toma at 857.

In Toma, the claimed invention was a computer program for translating a source human language (e.g., Russian) into a target human language (e.g., English). The court found that the claimed computer implemented process was within the "technological art" because the claimed invention was an operation being performed by a computer within a computer.

The decision in State Street Bank & Trust Co. v. Signature Financial Group, Inc. never addressed this prong of the test. In State Street Bank & Trust Co., the court found that the "mathematical exception" using the Freeman-Walter-Abele test has little, if any, application to determining the presence of statutory subject matter but rather, statutory subject matter should be based on whether the operation produces a "useful, concrete and tangible result". See State Street Bank & Trust Co. at 1374. Furthermore, the court found that there was no "business method exception" since the court decisions that purported to create such exceptions were based on novelty or lack of enablement issues and not on statutory grounds. Therefore, the court held that "[w]hether the patent's claims are too broad to be patentable is not to be

judged under °101, but rather under §§102, 103 and 112." See State Street Bank & Trust Co. at 1377. Both of these analysis goes towards whether the claimed invention is non-statutory because of the presence of an abstract idea. Indeed, State Street abolished the Freeman-Walter-Abele test used in Toma. However, State Street never addressed the second part of the analysis, i.e., the "technological arts" test established in Toma because the invention in State Street (i.e., a computerized system for determining the year-end income, expense, and capital gain or loss for the portfolio) was already determined to be within the technological arts under the Toma test. This dichotomy has been recently acknowledged by the Board of Patent Appeals and Interferences (BPAI) in affirming a §101 rejection finding the claimed invention to be non-statutory. See Ex parte Bowman, 61 USPQ2d (BNA) 1669 (BdPatApp&Int 2001).

In the present application, Claims 1-15 have no connection to the technological arts. None of the steps indicate any connection to a computer or technology. The step of communicating monitoring and using Internet does not show what is down by the invention computer except communication of display, this display can be done manually with slides or slides are emailed as attachments (well known step).

Claim Rejections - 35 USC § 102

1. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

Claims 1, 3-9, 11-16, 18-24, 26-30 rejected under 35 U.S.C. 102(e) as being anticipated by Limousin et al (hereinafter Limousin – US 6938242).

Re. Claim 1, Limousin discloses creating a plurality of issues and risks using a globally-accessible system [see entire document particularly, Abstract; Figures 1, 3-5, 9, 11; C1 L5-L56; C2 L10-36; C3 L65 to C4 L9; see task]; and

monitoring and tracking the plurality of issues and risks via the globally-accessible system using a plurality of color-coded (coded) visual displays graphically indicating favorable or unfavorable process progress over time [Figure 16; C3 L65 to C4 L9; C10 L31-L40 -- color-coded same as coded, the Gantt chart of figure 16 can have color attributes, for example, diamond in figure 16 represents completion date can have color green which is visible on screen or printed by color printer].

Re. Claims 3-4, Limousin discloses wherein monitoring and tracking the plurality of issues and risks using a plurality of color-coded visual displays further comprises graphically highlighting process management roadblocks (see permit approval) and wherein monitoring and tracking the plurality of issues and risks using a plurality of color-coded visual displays further comprises graphically highlighting exception status (expected first use of the medical system) [Fig. 9-11; C9 L62 to C10 L40; C11 L1-L25 – see figure 11 includes list of tasks which can be edited and lists more item (#270)].

Re. Claims 5-7, Limousin discloses wherein the globally-accessible system comprises a globally-distributed computer network [Figure 1; C2 L41-L45; C2 L63-67; C3 L44-L47; C3 L65 to C4 L9; C5 L16-L33 – LAN and WAN are well known communication

networks].

Re. Claim 8, Limousin discloses globally-accessible system (Internet) may be accessed by a plurality of remote users simultaneously [Figure 1; C5 L17-L33].

Re. Claim 9, Limousin discloses creating a plurality of issues and risks using a globally-accessible system [Figures 1, 3-5, 9, 11C1 L5-L56; C2 L10-36; C3 L65 to C4 L9];

monitoring and tracking the plurality of issues and risks via the globally-accessible system using a plurality of color-coded visual displays graphically indicating favorable or unfavorable process progress over time [Figure 16; C3 L65 to C4 L9; C10 L31-L40]; and

wherein the globally-accessible system (Internet) may be accessed by a plurality of remote users simultaneously [Figure 1; C5 L17-L33].

Re. Claims 11-12, claims 11-12 are substantially same as claim 3-4, therefore claims 11-12 are rejected with same rational as claims 3-4.
Re. Claims 13-15, claims 13-15 are substantially same as claim 5-7, therefore claims 13-15 are rejected with same rational as claims 5-7.

Re. Claim 16, Limousin discloses an issue management module (model installation plan) operable for creating, storing, and graphically displaying the status of a plurality of issues [C2 L10-L23; C6 L17-L49; C1 L5-L56; C2 L10-36; C3 L65 to C4 L9];

a risk management module operable for creating, storing, and graphically displaying the status of a plurality of risks; a plurality of color-coded visual displays for graphically displaying the status of the plurality of issues and risks; a processor operable for manipulating information related to the plurality of issues and risks [C2 L10-L23; C3 L65 to C4 L9; C10 L31-L40]; and

a communications network operable for communicating information related to the plurality of issues and risks to and from a plurality of remote users [C2 L41-L45; C2 L63-67; C3 L44-L47; C3 L65 to C4 L9; C5 L16-L33].

Re. Claims 18-19, claims 18-19 are substantially same as claim 3-4, therefore claims 18-19 are rejected with same rational as claims 3-4.

Re. Claims 20-22, claims 20-22 are substantially same as claim 5-7, therefore claims 20-22 are rejected with same rational as claims 5-7.

Re. Claim 23, claim 23 is substantially same as claim 8, therefore claim 23 is rejected with same rational as claim 8.

Re. Claim 24, Limousin discloses an issue management module operable for creating, storing, and graphically displaying the status of a plurality of issues [C2 L10-L23; C6 L17-L49; C1 L5-L56; C2 L10-36; C3 L65 to C4 L9];

a risk management module operable for creating, storing, and graphically displaying the status of a plurality of risks; a plurality of color-coded visual displays for graphically displaying the status of the plurality of issues and risks; a processor operable for manipulating information related to the plurality of issues and risks [C2 L10-L23; C3 L65 to C4 L9; C10 L31-L40]; and

a communications network operable for communicating information related to the plurality of issues and risks to and from a plurality of remote users simultaneously [C2 L41-L45; C2 L63-67; C3 L44-L47; C3 L65 to C4 L9; C5 L16-L33].

Re. Claims 26-27, claims 26-27 are substantially same as claim 3-4, therefore claims 26-27 are rejected with same rational as claims 3-4.

Re. Claims 28-30, claims 28-30 are substantially same as claim 5-7, therefore claims 28-30 are rejected with same rational as claims 5-7.

Claim Rejections - 35 USC § 103

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

Claims 2, 10, 17 and 25 rejected under 35 U.S.C. 103(a) as being unpatentable over Limousin in view of Martin et al, March 1987 "A Project Accountability Chart (PAC)", Journal of Systems Management (hereinafter Martin).

Re. Claim 2, Limousin discloses wherein monitoring and tracking the plurality of issues and risks using a plurality of color-coded visual displays. Limousin does not explicitly disclose graphically representing a risk probability number (RPN). However, Martin disclose this feature [see entire document, pages 6-9, particularly Exhibits, pages 6, page 7 col. 2 # 3; page 8 col. 2 – see artistic, 25% activity completion] to provide a clear statement for critically path estimates and accomplishment. It would have been obvious at the time the invention was made to a person having ordinary skill in the art to combine the disclosure of Limousin and Martin and include displaying risk number to display a clear visual management chart with probability of accomplishments.

Re. Claim 10, claim 10 is substantially same as claim 2, therefore claim 10 is rejected with same rational as claim 2.

Re. Claim 17, claim 17 is substantially same as claim 2, therefore claim 17 is rejected with same rational as claim 2.

Re. Claim 25, claim 25 is substantially same as claim 2, therefore claim 25 is rejected with same rational as claim 2.

Conclusion

The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. Applicant is required under 37 CFR ' 1.111 (c) to consider the references fully when responding to this action.

Ewing, 1994 "Using Microsoft Project 4 for Windows, 1994" discloses Microsoft's software used for project management using windows and how to use the software to develop, prepare project millstones, scheduling, creating and editing formatted Gantt charts.

Tommy Wedlund, Nov 2000 "Global Product Development Supported by Groupware" discloses project management tools which enabled a creation of virtual global teams and communication between them to share project activities.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Harish T. Dass whose telephone number is 571-272-6793. The examiner can normally be reached on 8:00 AM to 4:50 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Hyung S. Sough can be reached on 571-272-6799. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Harish T Dass
Examiner
Art Unit 3628

9/27/05

HYUNG SOUGH
SUPERVISORY PATENT EXAMINER
TECHNOLOGY CENTER 3600

Notice of References Cited	Application/Control No. 09/882,639	Applicant(s)/Patent Under Reexamination KORNFEIN ET AL.	
	Examiner Harish T. Dass	Art Unit 3628	Page 1 of 1

U.S. PATENT DOCUMENTS

*		Document Number Country Code-Number-Kind Code	Date MM-YYYY	Name	Classification
	A	US-6,938,242	08-2005	Limousin et al.	717/121
	B	US-			
	C	US-			
	D	US-			
	E	US-			
	F	US-			
	G	US-			
	H	US-			
	I	US-			
	J	US-			
	K	US-			
	L	US-			
	M	US-			

FOREIGN PATENT DOCUMENTS

*		Document Number Country Code-Number-Kind Code	Date MM-YYYY	Country	Name	Classification
	N					
	O					
	P					
	Q					
	R					
	S					
	T					

NON-PATENT DOCUMENTS

*		Include as applicable: Author, Title Date, Publisher, Edition or Volume, Pertinent Pages)
	U	Martin, Merle P.; Trumbly, James E. "A Project Accountability Chart (PAC)",Journal of Systems Management; Mar 1987; 38, 3
	V	Ewing, 1994 "Using Microsoft Project 4 for Windows, 1994"
	W	Tommy Wedlund, Nov 2000 "Global Product Development Supported by Groupware"
	X	

*A copy of this reference is not being furnished with this Office action. (See MPEP § 707.05(a).)
Dates in MM-YYYY format are publication dates. Classifications may be US or foreign.

A Project Accountability Chart (PAC)

BY DR. MERLE P. MARTIN AND JAMES E. TRUMBLY

■ One of the more exhilarating joys in the life of a systems designer is when the design project takes off, when it becomes a self-fulfilling prophesy. Everyone on the project knows it will now succeed. Task snags which would have caused gloom earlier in the project, now are attacked almost cheerfully with scotch tape and bailng wire.

Many ingredients have gone into such a fulfilling occasion, among these are planning, leadership, adaptability, and a modicum of good luck. However, at this point of project takeoff, it is momentum which has won the day. Much of this momentum can be credited to precise accountability for the project's many interrelated tasks.

Often hidden in the reasons for project success is some visual project management chart. It shows all involved parties where the project is, where it is supposed to be at any point in time, who is responsible for current tasks, and where the project could run into problems. The effective visual project management chart is not just an historical record of what has happened. It is an authoritative finger pointing to what must happen next, and who must make it happen.

The effective project management chart provides a clear, open statement of project accountability. Projects may still falter with such a chart. However, I have never seen a project succeed without one. This article provides guidance for the development of a project accountability chart (PAC).

Gantt Chart for System Development Project

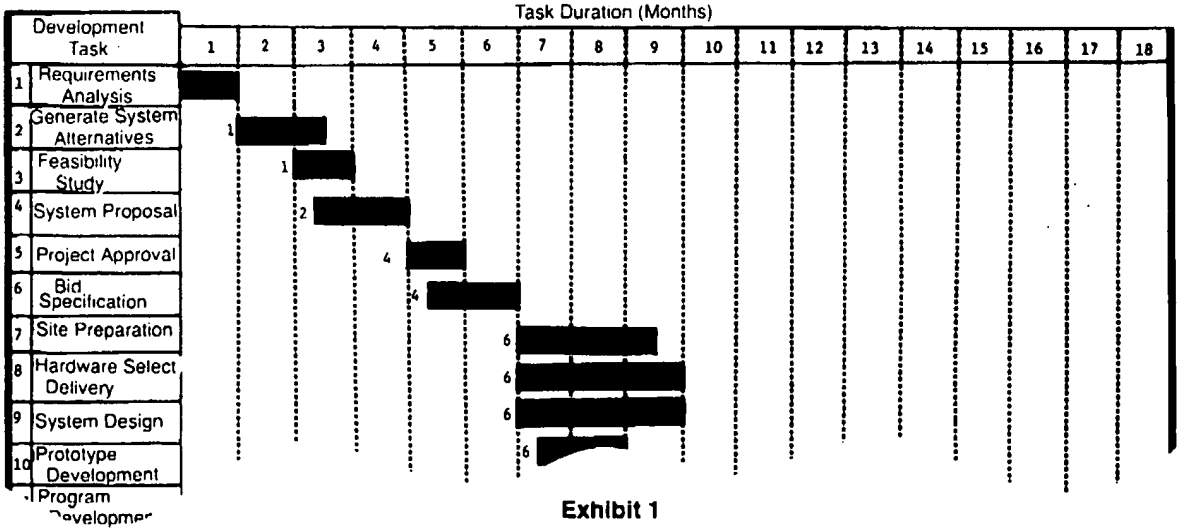

Exhibit 1

Current Techniques: The most popular project management techniques are network models and Gantt charts. The most commonly used network model is the Program Evaluation and Review Technique (PERT). As Nordbotten states[1]:

> "The PERT network and the Gantt chart are complementary tools for implementation management. The PERT network highlights the tasks required, their sequence, and their independencies, whereas the Gantt chart highlights the resources required to complete the task and identifies overlapping activities"

The Gantt chart is comprised of the following dimensions:

(1) A horizontal time scale corresponding to the length of the project
(2) A vertical axis listing activities comprising the organization of the project
(3) For each activity, a horizontal bar, the length of which designates the duration of the activity
(4) A filling-in of the horizontal bar to demonstrate project status; an open bar designates an activity not yet begun; a fully filled-in bar designates a completed activity.
(5) In front of the bar, a list of any prerequisite activities.

The PERT diagram contains the following features:

(1) It does not use any single time scale
(2) It facilitates the analysis of interdependent tasks
    (a) some which must be performed in sequence, and
    (b) some which can be accomplished in parallel with other tasks
(3) It allows time and critical path estimates, including the use of probability statements[2].

These, obviously, are not all of the characteristics of these two scheduling techniques. Some of the others are the calculations of slack time, etc.

Both techniques have their separate advantages and disadvantages. The Gantt chart has a set horizontal time scale for easy reference, and its filled-in blocks allow quick assessment of project status. However, the Gantt chart fails to clearly show interdependency between events; the need for one activity to be completed before another can be started. The PERT diagram, on the other hand, handles interdependencies quite well and can be raised to the level of mathematical expectations. However, PERT's dimensionless time is difficult to quickly gauge. In addition, PERT lacks a "fill-in" capability to estimate project status.

PERT Chart for System Development Project

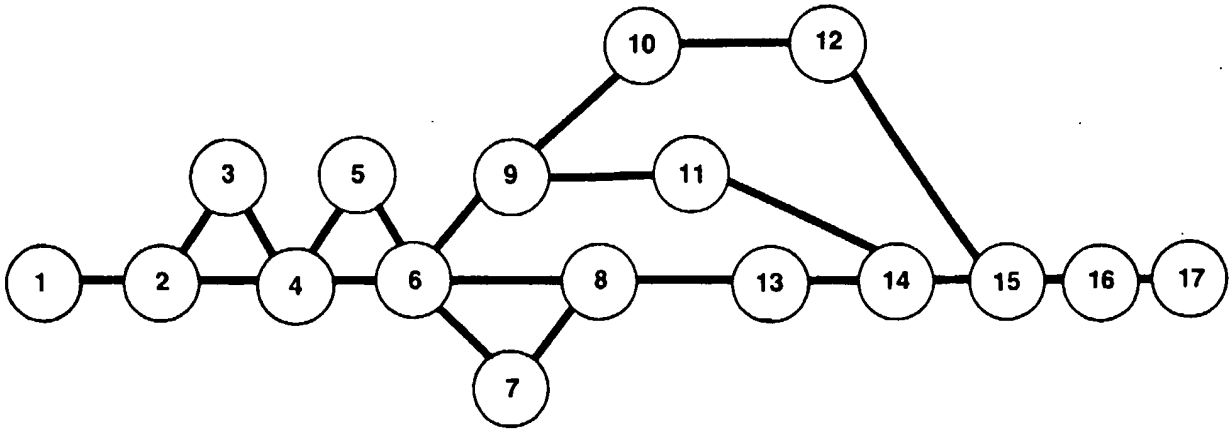

Exhibit 2

Both techniques lack the critical element of project accountability. They both show what is to be done when, but not by whom. The Project Accountability Chart (PAC) provides the "who" dimension, while also borrowing most of the advantages of the Gantt chart and the PERT diagram.

The PAC — The Project Accountability Chart is a higher order technique. It can be used in conjunction with more detailed methods, much as the hierarchical chart can be used with an input-processing-output chart to form the commonly used HIPO combination[3]. For example, any specific activity on the PAC can be broken down into more detail using either Gantt charts or PERT diagrams (Exhibit 3).

Explosion of the PAC

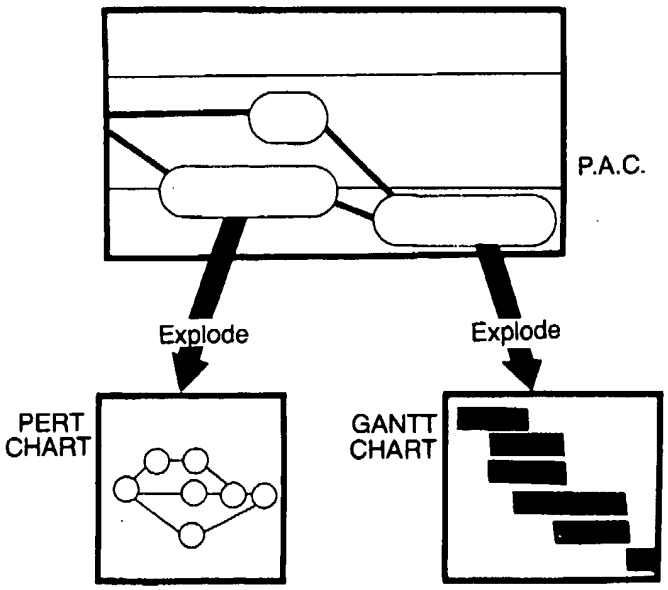

Exhibit 3

The PAC uses the Gantt chart's horizontal time axis. However, instead of the Gantt chart's vertical axis of detailed tasks, the PAC uses responsibility centers. Each organization responsible for one or more activities is included on the vertical scale. It is suggested that such organizations be centered around the middle of the vertical axis according to numbers of activities (the most active in the center, the next two most active on both sides of the first, etc.). This will provide visual symmetry to the ensuing PAC.

Visual aesthetics is important here. Much as aesthetic screen layouts inspire user confidence in interface programs, so does an aesthetic project display evoke confidence in the authenticity and organization of the project.[4] The Project Accountability Chart should not be gaudy, but it certainly should be artistic.

Project activities are expressed as nodes, as in PERT diagrams. These nodes have the following characteristics:

1. The name of the activity (e.g., DEVELOP PROTOTYPE) is superimposed.
2. The front edge of the node is at the intersection of beginning date (horizontal axis) and accountability center (vertical axis).
3. As in a PERT diagram, lines connect interdependent nodes.
4. Nodes are shaded or hatched to reflect activity status (e.g., 25 percent activity completion is indicated by one quarter of the node being shaded).
5. Labeled connections can be used to avoid confusion if the PAC gets too crowded. (See, for example, the connector labeled "A" in Exhibit 4.)
6. If a task overlaps accountability centers, that indicates the responsibility for that task is shared by both centers.

An example of a Project Accountability Chart for a Requirements Analysis is shown in Exhibit 4.

Enhancing Project Success

There are several methods of presentation for the Project Accountability Chart which can be used to enhance the probability of overall project success.

1. Placement: The PAC should be placed on a large wall in either the project manager's office or in a conference room where the project team most often meets. If the project is reasonably successful, public display of the PAC will generate the momentum discussed in the

P.A.C. for System Development Project

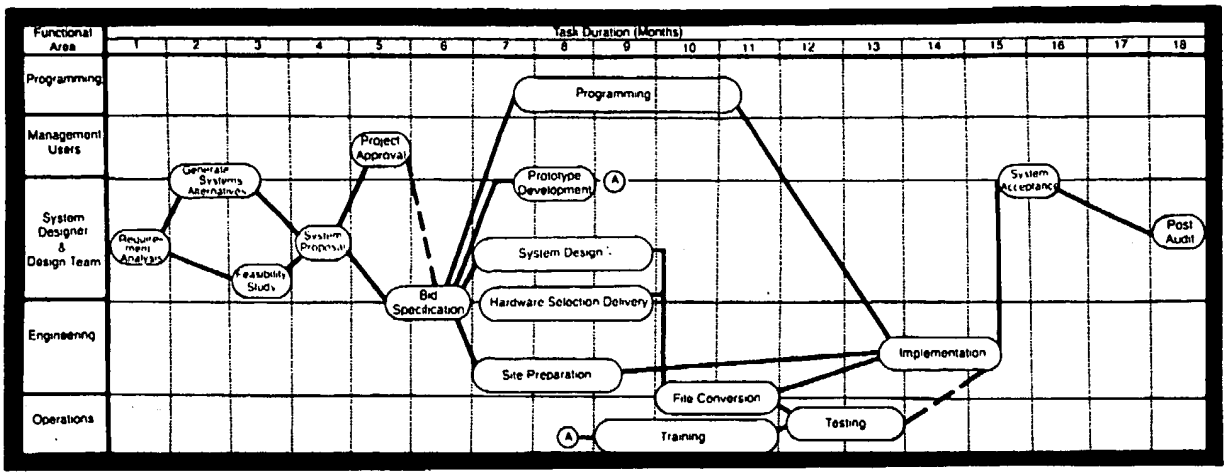

Exhibit 4

beginning of this article. On the other hand, if the project is slipping, common embarrassment may serve to acquire the requisite resources to bring the project back on schedule.

2. Project Status: The status of individual project tasks (nodes) can be shown by filling in that node according to the percent of the project that is complete. For example, a task that is 25 percent complete can have its designated node 25 percent covered. The covering can either be done by hatching or by the overlay of a transparent, colored material.

The comparison of where the project is to where it should be can be accomplished by a moving vertical bar (ruler) marking the current date. All uncompleted tasks to the left of the date bar are behind schedule. All completed portions of tasks to the right of the date bar are ahead of schedule.

3. Rescheduling: If a task is rescheduled, it can be placed in its new time/responsibility center grid and relinked to interdependent events. The replaced node may either be opaqued out or left in the chart to show incidents of rescheduling. If the entire project is rescheduled, scales for the horizontal time dimension can be relabeled. A very important aspect of PERT has been included in PAC. That aspect is the ability to "crash" the network, or collapse the slack times around the critical path.

4. Status Reports: The visual PAC chart can be typed in a reduced scale on a 8 1/2 × 14 inch sheet of paper. Project reports can then be produced by adding to the last project report the additions shown on the visual wall chart.

5. Individual Responsibility Center Charts: Each vertical responsibility section of the Project Responsibility Chart can serve as a separate project control chart for the applicable responsibility center.

Conclusion

Visual display of project status can help build project momentum. A display which highlights task accountability will spur responsibility centers to accomplish their designated contributions to the total project. Such a display is the Project Accountability Chart (PAC), a combination of the Gantt chart and PERT diagram. The PAC combines the advantages of these two commonly used scheduling techniques. In addition, the PAC highlights task responsibilities particularly for tasks behind schedule. Use of the Project Accountability Chart (PAC) should increase the probability of the project being completed in time. •jsm

References

1. Nordbotten, Joan, *The Analysis and Design of Computer-Based Information Systems*, (Houghton Mifflin Company. Boston, Massachusetts, 1985), pg. 295.
2. Bierman, H., Bonini, C., and Hausman, W., *Quantitative Analysis for Business Decisions*, (Richard D. Irwin, Inc., Homewood, Ill., 1973), Chapter 21.
3. Hussain, D. and Hussain, K., *Information Processing Systems for Management* (Richard D. Irwin, Inc., 1985), pg. 299.
4. Dean, M., "How a Computer Should Talk to People", *IBM Systems Journal*, Vol. 21, No. 4, July 1980.

Using Microsoft Project 4 for Windows

Library of Congress Catalog No.: 94-65883

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Marketing Manager: Greg Wiegand

Dedication

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Using Microsoft Project 4 for Windows

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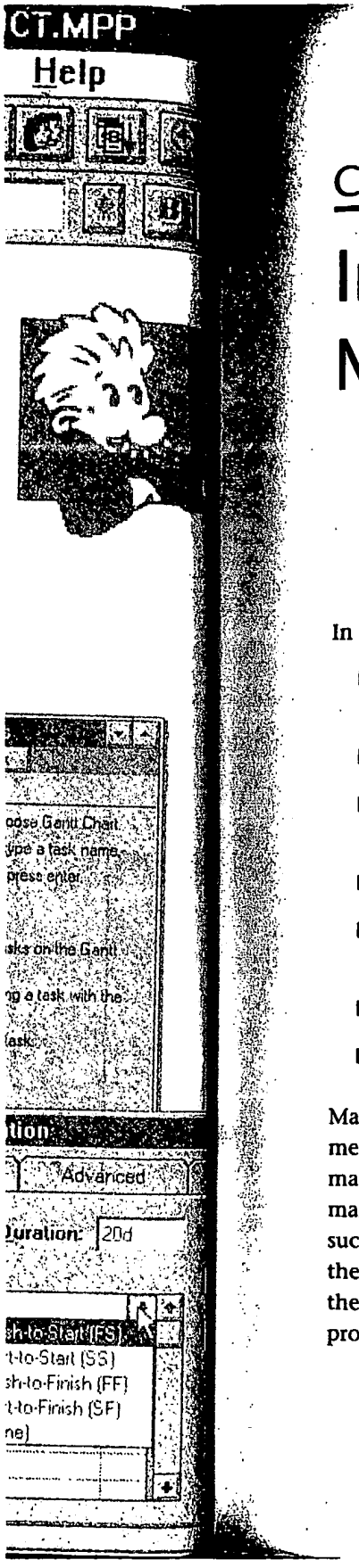

Chapter 1

Introducing Project Management

In this chapter, you learn

- What activities in the organization are appropriate for project management tools.
- The functions of the project manager.
- The advantages of using project management and project management software.
- General guidelines for project managers.
- The general steps you should take in developing a project with Microsoft Project.
- How project schedules are calculated by the computer.
- The essential vocabulary of project management.

Managing projects differs somewhat from more general management assignments. This chapter gets you acquainted with the unique problems of project management and outlines the benefits you can gain from using a project management software product like Microsoft Project. General guidelines for successful project management are included, as well as a brief explanation of the methodology used in project scheduling. Also included is a checklist of the major steps you follow in using Microsoft Project to plan and manage a project.

Publisher: Corinne Walls
Director: Lisa A. Bucki
Editor: Anne Owen
Manager: Greg Wiegand

What Is a Project?

Project management differs from conventional management in that a *project* is a limited concept that is usually more narrowly focused than traditional management goals, such as managing an ongoing organization to assure the success and survival of the organization. The following list shows several features that distinguish projects from other managerial assignments:

- **Projects are temporary.** A project involves a temporary, one-time goal or objective. Managing a department is an ongoing assignment that extends into the foreseeable future, perhaps for the life of the organization. Problems and challenges come and go; providing continuity is an inherent aspect of departmental management.

  A project, on the other hand, is a short-term assignment relative to the life of the organization, lasting only until the project's objectives are achieved. A project has a defined start and finish date.

  Selecting and installing a new word processor, for example, is a project; ongoing management of the word processing pool is not a project.

- **Project objectives are specific and measurable.** Project goals are stated in terms of specific performance objectives, not in vague generalities that call for unspecified improvements.

  You can measure the success or failure of a project by the degree to which the performance satisfies the specifications in the goal.

- **Projects are subject to the immediate constraints of performance, time, and budget.** A project exists to deliver a specific performance objective, and the quality of the performance must be met within the confines of other constraints.

  Projects are constrained by time commitments. Usually, either the project start date or the finish date (or both) must meet some time requirement. The overall time constraint needs to be explicitly incorporated into the project goal statement. Individual tasks within the project also may be subject to time constraints.

  Projects are subject to resource and cost constraints because of the financial limits of how much money you can spend to achieve the project objectives.

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Projects require resources—usually resourc
elsewhere within the organization. The pr
for resources with other projects and with
organization. Resources usually are the ma
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- **Projects must be managed so that th
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organization. Just as a society should not p
neglecting to account for the long-term im
made, the project manager must not lose s
organization. If a project meets its immedi
also promoting other projects and commit
the project is not really a success. If a proj
purposes, you must include maintaining t
environment as another constraint. If you
customer, you must include consideration
another constraint.

Considering these attributes of a project, project
define a *project* as a collection of activities and t
specific but temporary goal of the organization,
quality requirements, all the while subject to tir

A successful project must meet deadlines, stay w
performance according to specifications.

What Is Project Manag

The term *project management* refers to managing
successful completion of a project.

Project management is the application of mana
organize, staff, control, and direct resources of a
temporary or one-time specific goal.

The project manager is responsible for planning
achieve the project objectives and for organizin
zation to carry out the plan.

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Projects require resources—usually resources that are already in demand elsewhere within the organization. The project manager must compete for resources with other projects and with the ongoing activities of the organization. Resources usually are the main source of costs for a project.

- **Projects must be managed so that the immediate goals are achieved without damaging the long-term viability of the organization.** A project is a short chapter in the ongoing life of the organization. Just as a society should not pursue short-term goals while neglecting to account for the long-term impact of the decisions that are made, the project manager must not lose sight of the larger goals of the organization. If a project meets its immediate goals, but does so without also promoting other projects and commitments of the organization, the project is not really a success. If a project is undertaken for internal purposes, you must include maintaining the healthy fabric of the work environment as another constraint. If you undertake a project for a customer, you must include consideration of good customer relations as another constraint.

Considering these attributes of a project, project management studies usually define a *project* as a collection of activities and tasks designed to achieve a specific but temporary goal of the organization, with specific performance or quality requirements, all the while subject to time and cost constraints.

A successful project must meet deadlines, stay within budget, and deliver performance according to specifications.

What Is Project Management?

The term *project management* refers to managing the activities that lead to the successful completion of a project.

Project management is the application of management principles to plan, organize, staff, control, and direct resources of an organization in pursuit of a temporary or one-time specific goal.

The project manager is responsible for planning the actions or tasks that will achieve the project objectives and for organizing the resources of the organization to carry out the plan.

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The staffing function for project management is more often a question of negotiating resource commitments with line managers than of recruiting new employees. The personnel often come from the existing work force, and the facilities and equipment often must be shared with the regular operations of the organization. Moreover, the project manager is not necessarily the supervisor for the resources used in a project—this function usually is the job of a line manager.

Defining projects and project management by the terms *temporary* and *short-term* is meant in a relative sense. A sales project may have a life of two weeks, and a project to build a nuclear power plant may have a life of fifteen years. But when compared to the life span of the organization, it is temporary.

Project management techniques evolved continually throughout the twentieth century, but the most rapid developments grew out of the rapidly increasing technology of the defense industry after World War II. Recent developments in general management theory and practice have sparked a renewed surge of interest in project management methods. Leading management specialists are advocating that the organization's work force be organized into more fluid work groups that approach many of the traditional functions of the organization as a series of projects. This approach has led managers to study the methodology of project management from a different point of view as they attempt to find guidelines for successful management strategies.

The Advantages of Using Project Management Software

Project management helps you achieve your project goal on time and on budget. Computer software can aid significantly in project management as a tool for recording, calculating, analyzing, and preparing presentations to help communicate the details of the project. However, the software cannot produce or even guarantee a successful project plan any more than a word processor can produce or guarantee a successful novel, or an accounting program can produce a profitable fiscal year.

Despite the preceding caveat, project management software can be a helpful tool in managing a project. Here are some of the most important advantages afforded by project management software:

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Project management software helps you develop a bett

- Because the software requires you to specify sary for meeting the project goal, you are fo about the details of the project. The discipli helps you organize a better plan.
- The screen views provide an organized pres your plan, which can improve your ability refine the plan.

Project management software makes calculated proje

- Based on the data you enter, the computer shows when each task should begin and en sources are scheduled to perform specific ta shows the probable costs of the project.

Project management software helps you detect incons plan.

- The computer detects when resources are s than are available or when deadlines are in provide the data in a knowledgeable way, t solve resource overallocations and deadlin

Project management software helps you communicat

- The software provides printed reports that upper-level management, who must appro
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- After the project is under way, you replace scheduled tasks with actual dates as tasks computer then revises the schedule to inc predicting new completion dates and cost vides you with valuable advance warning overruns, so you can take corrective meas

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Project management software helps you develop a better plan.

- Because the software requires you to specify precisely the tasks necessary for meeting the project goal, you are forced to think carefully about the details of the project. The discipline imposed by the software helps you organize a better plan.
- The screen views provide an organized presentation of the details of your plan, which can improve your ability to visualize, organize, and refine the plan.

Project management software makes calculated projections easier and more reliable.

- Based on the data you enter, the computer calculates a schedule that shows when each task should begin and end and when specific resources are scheduled to perform specific tasks. This schedule also shows the probable costs of the project.

Project management software helps you detect inconsistencies and problems in the plan.

- The computer detects when resources are scheduled for more hours than are available or when deadlines are impossible to meet. If you provide the data in a knowledgeable way, the computer helps you resolve resource overallocations and deadline commitments.

Project management software helps you communicate the plan to others.

- The software provides printed reports that make selling the plan to upper-level management, who must approve the plan, an easier task.
- The printed reports also improve communications about the plan to supervisors or workers, which makes securing their approval and cooperation easier.

Project management software helps you track progress and detect potential difficulties.

- After the project is under way, you replace the projected dates for the scheduled tasks with actual dates as tasks are begun and completed. The computer then revises the schedule to incorporate the actual dates, predicting new completion dates and costs. This new projection provides you with valuable advance warning of potential delays or cost overruns, so you can take corrective measures if necessary.

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- If circumstances change after the project is underway, the computer makes it easier to adjust the plan, and see the consequences of this adjustment.

It cannot be stressed too much, however, that project management software, like accounting software, is only as useful as the reliability and completeness of the data that you supply.

General Guidelines for Project Managers

The following guidelines are offered as aids to successful project management. Most of these guidelines are common-sense management techniques, but reviewing them is always a useful exercise.

- Keep in mind at all times that your success as a project manager depends largely on your ability to motivate people to cooperate in the project. No computer program or well-designed plan can compensate for ineffective people skills. Computers may respond to logic, but people respond to all that is positive and negative about human emotions.

- Establish your authority as project manager and your role as coordinator of project planning at the outset. If you are appointed to this role, ask the officer making the appointment to issue a statement that validates your authority.

- Make the planning stage a group effort as much as possible. You will reap the benefits of a wider base of experience and expertise, and you will find it much easier to secure approval of the plan and get people committed to the final project plan.

- Set a clear project goal.

  State the goal of the project precisely and simply in a manner that everyone associated with the project (supervisors who must approve the project, managers who work with the project, and others who must do the work) can read and understand. To this end, prepare a concise summary statement of the goal of the project.

  State your goal in terms that you can measure. If the goals are realized, [illegible] then becomes possible.

Secure agreement on the goal by all who
who must provide supervision during th

State the goal in realistic and attainable t

State a definite time frame in the goal—i
ment to the project. The goal "Install a r
the company," for example, is ill-definec
software throughout the company and t
June 1" is more inclusive and more speci

Define the performance requirements ar

Nail down all fixed deadlines or time co

Determine the budgetary limitations of t

State the performance or quality specific
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Work, to the creators of the specificatior
and workers. Make sure that no misunde
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- Organize the tasks of the project into m
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from the outset.

For example, the conversion to a new w
involve the following phases and milest

Determine the features required of

Review available products.

Select the product to be used.

Software selected (milestone)

Buy the software.

Set up help desk.

Install software.

3/28

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s possible.

Secure agreement on the goal by all who must approve the project or who must provide supervision during the execution of the project.

State the goal in realistic and attainable terms.

State a definite time frame in the goal—it should be part of the commitment to the project. The goal "Install a new word processor throughout the company," for example, is ill-defined. "Install new word processor software throughout the company and train all personnel in its use by June 1" is more inclusive and more specific.

Define the performance requirements and specifications carefully.

Nail down all fixed deadlines or time constraints.

Determine the budgetary limitations of the project.

State the performance or quality specifications of the project with great care. Write and then distribute these specifications, in a Statement of Work, to the creators of the specifications, and also to the supervisors and workers. Make sure that no misunderstanding exists about what you expect from the people you are managing. Misunderstood specifications can prove extremely costly.

- Organize the tasks of the project into major phases or components and establish *milestones*, or interim goals, to mark the completion of each of these phases. These milestones serve as check points by which everyone can gauge how well the project is on target after the work begins. This *top-down* approach helps to provide organization for the project plan from the outset.

  For example, the conversion to a new word processing product may involve the following phases and milestones:

  Determine the features required of the software.

  Review available products.

  Select the product to be used.

  Software selected (milestone)

  Buy the software.

  Set up help desk.

  Install software.

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Software installed (milestone)

Train all users.

Conversion complete (milestone)

- List the tasks that must be completed to reach each milestone and estimate the duration of each task.
- Diagram the flow of activity to show the instances where tasks must be performed in a specific sequence.
- Distribute the project plan to all who are responsible for supervising or doing the work. Secure their agreement that the assumptions of the plan are sound and that all involved are willing to do their part. Revise the plan as needed to secure supervisory agreement.
- Distribute printed copies of the revised schedule with charts and tables to identify clearly the scope of the project and to identify clearly the responsibilities of all who must contribute to making the project a success.
- Secure firm commitments from all responsible parties to contribute as outlined in the finalized plan.
- After work on the project is under way, monitor the work's progress by tracking actual performance and results, which is the best way to discover problems early so that you can take corrective actions.
- Tracking these performance details also helps document problems and explain the results if the project goals are not met.
- If problems arise that make finishing the project on time or within budget unlikely or impossible, you can give superiors ample warning so that expectations regarding the project can be adjusted.
- After the project is completed, acknowledge and thank all participants who made the project a success.

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A Checklist for Using Microsoft Project

Microsoft Project is so rich with options you can easi direction when you start working. The following list view of using Microsoft Project to plan a project.

Preliminaries

Before you start entering tasks into the computer, it some basic parameters that govern how Microsoft Pr (These topics are covered in Chapter 3, "Setting Up a ment.") To set up the preliminaries, take the followi

1. Define working days, non-working days, and r Microsoft Project's scheduling calendar.
2. If necessary, adjust the number of hours that M the time units of *day* and *week*. These definitio Microsoft Project calculates the duration of ta duration of the project.
3. Enter the basic data that describes the project: pany name, project manager, and the expecte
4. List the resources used in the project, define tl source calendars for all resources that show th eral calendar of working days and hours. You easily in the Planning section as in the Prelim here because many users maintain a template resources to use for entering new projects. For list already exists when they begin the project

Planning

Planning is the phase in which you outline the pro and after refining the plan, distribute the finalized volved in the project. These topics are discussed in To start planning the project, take the following st

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A Checklist for Using Microsoft Project

Microsoft Project is so rich with options you can easily lose your sense of direction when you start working. The following list is intended as an overview of using Microsoft Project to plan a project.

Preliminaries

Before you start entering tasks into the computer, it is a good idea to define some basic parameters that govern how Microsoft Project treats your data. (These topics are covered in Chapter 3, "Setting Up a New Project Document.") To set up the preliminaries, take the following steps:

1. Define working days, non-working days, and regular working hours in Microsoft Project's scheduling calendar.
2. If necessary, adjust the number of hours that Microsoft Project uses for the time units of *day* and *week*. These definitions determine how Microsoft Project calculates the duration of tasks and, therefore, the duration of the project.
3. Enter the basic data that describes the project: the project name, company name, project manager, and the expected start date or finish date.
4. List the resources used in the project, define the costs, and create resource calendars for all resources that show the exceptions to the general calendar of working days and hours. You can include this step as easily in the Planning section as in the Preliminaries section. It is placed here because many users maintain a template of the organization's resources to use for entering new projects. For these users, the resource list already exists when they begin the project planning.

Planning

Planning is the phase in which you outline the project plan, review the plan, and after refining the plan, distribute the finalized plan to all who are involved in the project. These topics are discussed in Chapters 4 through 9. To start planning the project, take the following steps:

1. List the major phases of the project in outline form and then fill in the detailed tasks and milestones in the project. Estimate each task's duration. This is the topic of Chapter 4, "Creating a Task List."
2. If the start or finish date of a task is in any way constrained to a fixed date, enter the date at this point. Define the required sequencing of

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tasks—where tasks must be scheduled so that the start or finish is linked to the scheduled start or finish of other tasks. These topics are covered in Chapter 5, "Entering Scheduling Requirements."

3. Assign resources to the tasks. Defining and assigning resources is covered in Chapter 8, "Defining Resources and Costs," and Chapter 9, "Assigning Resources and Costs to Tasks."

4. Assign all fixed costs to the tasks. Costs are also covered in Chapter 9.

5. Review the schedule that Microsoft Project has calculated so far, and correct all problems by taking the actions discussed in the following list:

   Identify and resolve scheduling problems where fixed date commitments are in conflict or where resources are assigned to do more work than can be done in the time period allowed.

   Identify costs that are over budget and try to find ways to lower the costs.

   If the time constraint for the overall project is not met by the schedule, you must find ways to revise the schedule to meet the requirements of the project goal.

   Previewing and refining the schedule are covered in Chapter 10, "Auditing the Task Schedule," and Chapter 11, "Resolving Problems in the Project Plan."

6. Print and distribute the project schedule for review by the managers who must approve the plan and by project supervisors and workers. Basic printing instructions are provided in Chapters 9 and 10. More comprehensive information about printing is provided in Chapter 16, "Printing Views and Reports."

7. Revise the plan, if necessary, to accommodate the requested suggestions or changes.

8. Print and distribute the final schedule to all parties for final approval, and secure from each party a firm commitment to the plan.

Managing the Project

In this phase, you monitor progress on the project, recor
ence and calculating new schedules when actual dates fa
planned dates. These topics are covered in Chapter 12, "
Project." To handle the task of monitoring work on the p
steps:

1. Make a copy of the final schedule plan as a basis fc
   poses after the project gets under way.

2. Track actual start dates, finish dates, percentage of
   costs incurred, and enter these details into Micros
   puter will revise the schedule to incorporate these
   remaining planned schedule.

3. Review the revised schedule for problems and, if p
   tive measures. Notify all participants of changes i
   and time of tasks for which each participant is re

4. After the project is completed, print final reports
   show the actual work and costs and to show com
   original plan.

Project Management Scheduling Techniques

The methods used for scheduling tasks and resources i
include several techniques that you need to understar
Microsoft Project effectively. Although the implicatio
reviewed where needed in upcoming chapters, gainin
useful before you get into the details of planning and

The Critical Path Method

The fundamental scheduling method used in project
Critical Path Method (CPM). To use the CPM model,
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information about printing is provided in Chapter 16,
and Reports."

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each party a firm commitment to the plan.

Managing the Project

In this phase, you monitor progress on the project, recording actual experience and calculating new schedules when actual dates fail to match the planned dates. These topics are covered in Chapter 12, "Managing the Project." To handle the task of monitoring work on the project, follow these steps:

1. Make a copy of the final schedule plan as a basis for comparison purposes after the project gets under way.
2. Track actual start dates, finish dates, percentage of work completed, and costs incurred, and enter these details into Microsoft Project. The computer will revise the schedule to incorporate these actual events into the remaining planned schedule.
3. Review the revised schedule for problems and, if possible, take corrective measures. Notify all participants of changes in the scheduled date and time of tasks for which each participant is responsible.
4. After the project is completed, print final reports as documentation to show the actual work and costs and to show comparisons with the original plan.

Project Management Scheduling Techniques

The methods used for scheduling tasks and resources in project management include several techniques that you need to understand in order to use Microsoft Project effectively. Although the implications of these methods are reviewed where needed in upcoming chapters, gaining an overview can be useful before you get into the details of planning and coordinating a project.

The Critical Path Method

The fundamental scheduling method used in project management is the Critical Path Method (CPM). To use the CPM model, you must identify all the tasks that need to be completed, stipulate how long each task is expected to take (the task's *duration*), and define all sequencing requirements that govern when you can schedule a task. A *sequencing requirement* means that a task

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cannot begin until another task is completed or at least has already begun. When you build a house, for example, you don't start framing the walls until the foundation is laid.

The CPM method takes into account all the task data, and calculates the overall duration of the project by calculating the combined durations of the tasks, when all tasks are chained together in the required sequences.

Figure 1.1 illustrates a simple project that contains six tasks. Tasks A, B, and C must be performed in sequence; tasks X, Y, and Z must also be performed in sequence. Both sequences can go on at the same time; however, both sequences must be finished before the project is complete.

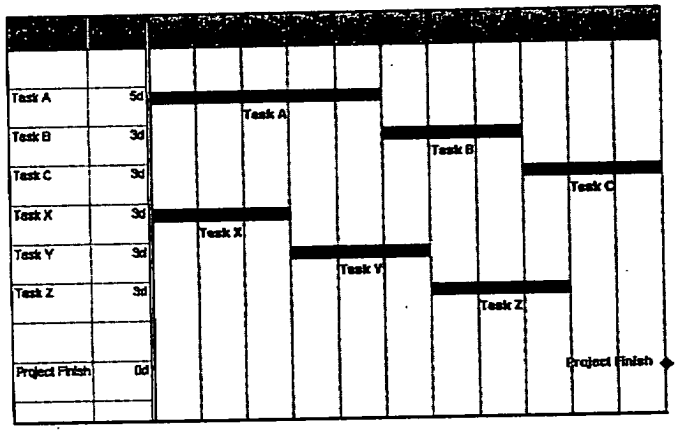

Fig. 1.1
The longest sequence of tasks determines the finish date for the project.

If parallel task sequences are in progress at the same time, the overall duration of the project is the duration of the longest of these task sequences. In Figure 1.1, the sequence A-B-C takes 11 days, and the sequence X-Y-Z takes nine days. It takes 11 days—the duration of the longest sequence—to complete the project.

You cannot complete the project on schedule unless the tasks on the longest sequence are finished on schedule. These tasks, known as *critical tasks*, are vital to keeping the overall project on schedule. The sequence of critical tasks is a *critical path.*

In the figure 1.1, tasks A, B, and C are critical tasks, and the sequence A-B-C is the critical path. The X-Y-Z tasks are not critical. You could delay the completion of any one of these tasks for up to two days without causing a delay of the overall project. The X, Y, and Z tasks are said to have *slack.*

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Critical tasks have no slack. These tasks cannot be delaye finish on schedule, which is the operational definition of

Identifying the critical tasks is an important step in mana pose that you need to shorten the duration of the overall known as *crashing* the schedule), and you are looking for that you can try to shorten. You need to focus attention and not on the noncritical tasks. Cutting time from non use—it's just a waste of time. This knowledge can save y time in analyzing ways to crash the project.

Resource-Driven Scheduling

Some tasks have a *fixed duration* in the sense that, no ma ers or resources you assign to the task, the duration still The task to deliver a small package to a nearby city, for driver and a truck. You probably won't shorten the dura placing two drivers in the truck. If, however, the task is of packages, a second driver could reduce the time it tak the packages. If changing the quantity of resources assig a change in the duration of the task, the task is said to b task. The schedule for the task is driven or determined b resources assigned.

Microsoft Project assumes that tasks are resource driven fixed duration tasks. If a task has a fixed duration, you explicitly as fixed duration. The program assumes that duration of a task if you increase the number of resour do the work.

The Calendar Used for Scheduling

Microsoft Project uses the factors outlined in the previ date, the duration of tasks, and the sequencing of tasks ule for tasks, and consults a calendar of days and hour can be scheduled as part of the calculation. The defaul any task can be worked on for up to eight hours a day,

You must customize the calendar to represent the wor your organization. If the organization has non-workin must enter these in the calendar so that Microsoft Pro tasks during these times.

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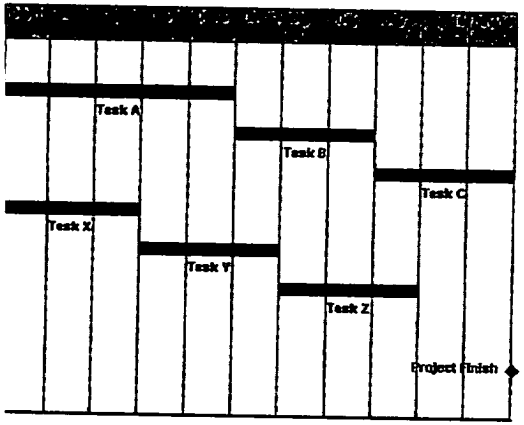
other task is completed or at least has already begun.
ıse, for example, you don't start framing the walls until

:s into account all the task data, and calculates the
: project by calculating the combined durations of the
:e chained together in the required sequences.

simple project that contains six tasks. Tasks A, B, and C
sequence; tasks X, Y, and Z must also be performed in
ıces can go on at the same time; however, both se-
ıed before the project is complete.



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tasks for up to two days without causing a delay of
X, Y, and Z tasks are said to have *slack*.

Critical tasks have no slack. These tasks cannot be delayed if the project is to finish on schedule, which is the operational definition of a critical task.

Identifying the critical tasks is an important step in managing a project. Suppose that you need to shorten the duration of the overall project (commonly known as *crashing* the schedule), and you are looking for some task durations that you can try to shorten. You need to focus attention on the critical tasks and not on the noncritical tasks. Cutting time from noncritical tasks is of no use—it's just a waste of time. This knowledge can save you a great deal of time in analyzing ways to crash the project.

Resource-Driven Scheduling

Some tasks have a *fixed duration* in the sense that, no matter how many workers or resources you assign to the task, the duration still remains unchanged. The task to deliver a small package to a nearby city, for example, requires a driver and a truck. You probably won't shorten the duration of the task by placing two drivers in the truck. If, however, the task is to deliver a truckload of packages, a second driver could reduce the time it takes to load and unload the packages. If changing the quantity of resources assigned to a task leads to a change in the duration of the task, the task is said to be a "resource-driven" task. The schedule for the task is driven or determined by the quantity of resources assigned.

Microsoft Project assumes that tasks are resource driven, that they are *not* fixed duration tasks. If a task has a fixed duration, you must define the task explicitly as fixed duration. The program assumes that you can shorten the duration of a task if you increase the number of resource units you assign to do the work.

The Calendar Used for Scheduling

Microsoft Project uses the factors outlined in the previous sections (the start date, the duration of tasks, and the sequencing of tasks) to calculate a schedule for tasks, and consults a calendar of days and hours during which work can be scheduled as part of the calculation. The default calendar assumes that any task can be worked on for up to eight hours a day, five days a week.

You must customize the calendar to represent the work days and shifts of your organization. If the organization has non-working days or hours, you must enter these in the calendar so that Microsoft Project cannot schedule tasks during these times.

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You also can create calendars for individual resources. The resource calendar identifies exceptions to the standard calendar that apply to a resource. When you assign a resource to do the work on a task, Microsoft Project examines the resource's calendar and schedules the work to take place on the days and during the times that the resource is available.

Scheduling Constraints

When calculating a schedule of dates for tasks, Microsoft Project schedules each task to begin as soon as possible, considering the task's position in the sequence of tasks. However, if a task must start or finish by a specific date, you can enter this requirement as a constraint on the scheduling of the task.

Unless absolutely necessary, do not enter start and finish constraints for individual tasks. Let the program calculate the start and finish dates for tasks.

From Here...

In this chapter, you had an overview of what project management is all about and how to go about planning a project in a general way. You also were introduced to some important terminology and concepts in project management.

- For an introduction to the Microsoft Project 4 interface, go on to Chapter 2, "Learning the Basics of Microsoft Project."
- If you are ready to jump right in and begin a project, see Chapter 3, "Setting Up a New Project Document," or Chapter 4, "Creating a Task List."
- If you are interested in how to print your project data, see Chapter 16, "Printing Views and Reports."
- If you want to know how to customize the views used by Microsoft Project, go to Chapter 17, "Using and Creating Views."

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Chapter 2

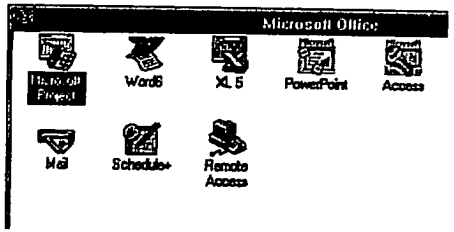
Learning the Ba Microsoft Proje

In this chapter you learn how to work in the Mi environment. Specifically, you learn how to

- Interpret and navigate the screen display.
- Use the menu commands.
- Open and save project files.
- Display different views of the your project
- Select tasks, resources, or individual task fie

Starting and Exiting Microsoft Project

When you install Microsoft Project, the Setup pr named Microsoft Project within the Microsoft Of fault if chosen during setup). Figure 2.1 shows th icon.



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- Use the menu commands.
- Open and save project files.
- Display different views of the your project data.
- Select tasks, resources, or individual task fields.

Starting and Exiting Microsoft Project

When you install Microsoft Project, the Setup program places a program icon named Microsoft Project within the Microsoft Office program group (by default if chosen during setup). Figure 2.1 shows the Microsoft Project program icon.

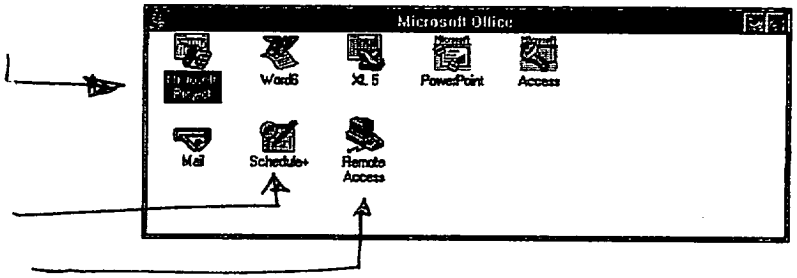

Fig. 2.1 The Microsoft Project 4 program icon.

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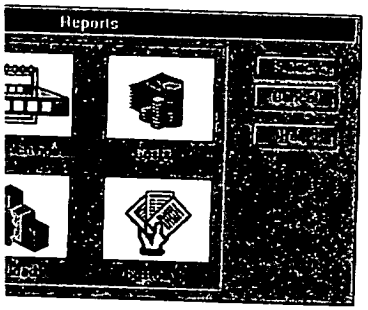
orts, and from that gallery choose the

to preview the report.

to send the report to your printer. Choose the
the project workspace.



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ns for individual days. Each base
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to prepare Microsoft Project for the task and
enter in a project. You can proceed from

List," is the first of four chapters that deal
relationships.

ces and Costs," is the first chapter to deal
assignments. You can enter resources before
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and Reports," offers instructions for print-
l project information as well as the views
s.

Chapter 4

Creating a Task List

Planning a project always begins with the creation of a concise but comprehensive goal statement. If the goal of the project is not clearly in focus from the outset, the task list very likely may need extensive revisions and can entail far more work in the long run. After the goal is agreed upon, the next major planning function is to draw up a list of activities that must be undertaken to achieve the project goal.

Using Microsoft Project to help create the task list can save a great deal of time and effort. At this stage of the process, the major contribution of the computer is as a word processing tool to help you enter, revise, and rearrange your ideas. The computer facilitates editing and reorganizing that always accompanies the initial stages of project planning.

This chapter begins with the simple mechanics of drawing and rearranging the order of the task list. After entering the task names, you must define the duration for your tasks. Microsoft Project can then calculate a preliminary schedule with start and finish dates for each task and for the project as a whole. This chapter shows alternative ways to enter, edit, and display the task list. The chapter ends with instructions for printing the project plan that you develop using the procedures in this chapter.

In Chapter 4, you learn how to

- Approach the planning process.
- Enter and edit project tasks.
- Utilize the various task sheets and forms.
- Outline the task list.

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Approaching the Planning Process

Project planning can begin with a top-down approach or a bottom-up approach. If you use a top-down approach, you start by identifying the major phases of the project. Then you fill in the components of each phase in greater detail until you create an outline of all the tasks that the project requires. This method is probably the most common approach to project planning.

All the entries in an outlined project are *tasks*. All tasks that have subordinate detail tasks indented under them are *summary tasks*, and they are treated differently from the tasks that have no subordinates (in other words, the tasks where the work actually gets done).

If you use the bottom-up approach, you begin by listing all the task details. You then arrange the details into an orderly progression, and you also may finish by creating an outline.

Microsoft Project simplifies both the top-down and the bottom-up approach. You can follow the top-down approach by entering the major phases as tasks and indenting subordinate tasks under the major tasks. Microsoft Project supports up to nine levels of indented subordinated detail. You also can follow the bottom-up approach, first entering all the detail tasks, then inserting summary items for groups of tasks to create summary tasks and indented subordinate tasks.

You can create a complete project plan without using outlining. Using outling has numerous advantages, however, and it significantly enhances your project's usefulness.

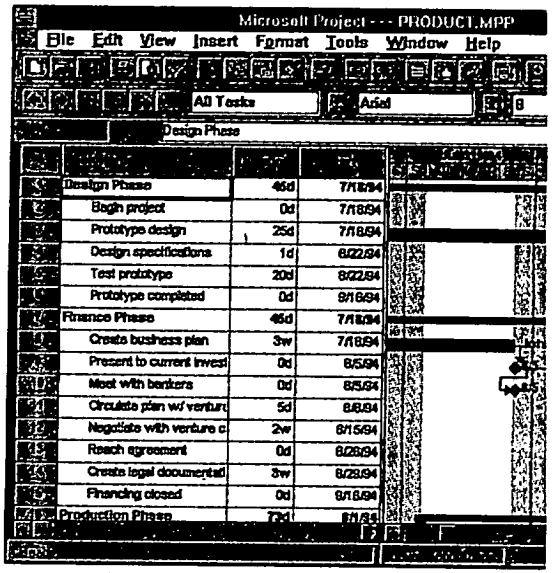
- Outlining facilitates an orderly planning process, with less likelihood of leaving out crucial steps.
- Outlined projects can be displayed with different levels of detail. You can collapse the outline to major topics only, or to any level of detail. You can easily tailor reports to any needed level of detail.
- The summary tasks in outlined projects automatically provide subtotals for the detail tasks under them, showing the duration, costs, and amount of work involved for all the detail tasks taken as a whole.

Outlining produces an organizational form that has traditionally been called the *Work Breakdown Structure*. The Work Breakdown Structure identifies major [illegible] multiple levels of detail under each major

label each task in such a way that the code identifies
the hierarchical structure, and these codes are identic
bers provided automatically by Microsoft Project. The
Microsoft Project automatically supplies outline numl
WBS codes. A WBS field exists for each task that can b
Information Form (introduced later in this chapter), a
automatically places the outline number in this field.

Entering and Editing Task
in the Gantt Chart

The initial view in Microsoft Project is the Gantt Char
the Gantt Chart view is not on-screen, select the View
Gantt Chart command.



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In the early 19th century, Henry Gantt popularized a n
now known as the Gantt Chart. The Gantt Chart displa
on the left side of the screen and a timescale with a bar
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the duration of each task and the chart's temporal relat
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he Planning Process

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label each task in such a way that the code identifies where the task fits into the hierarchical structure, and these codes are identical to the outline numbers provided automatically by Microsoft Project. The outlining feature of Microsoft Project automatically supplies outline numbers that serve well as WBS codes. A WBS field exists for each task that can be viewed on the Task Information Form (introduced later in this chapter), and Microsoft Project automatically places the outline number in this field.

Entering and Editing Tasks in the Gantt Chart

The initial view in Microsoft Project is the Gantt Chart view (see fig. 4.1). If the Gantt Chart view is not on-screen, select the **V**iew menu and choose the **G**antt Chart command.

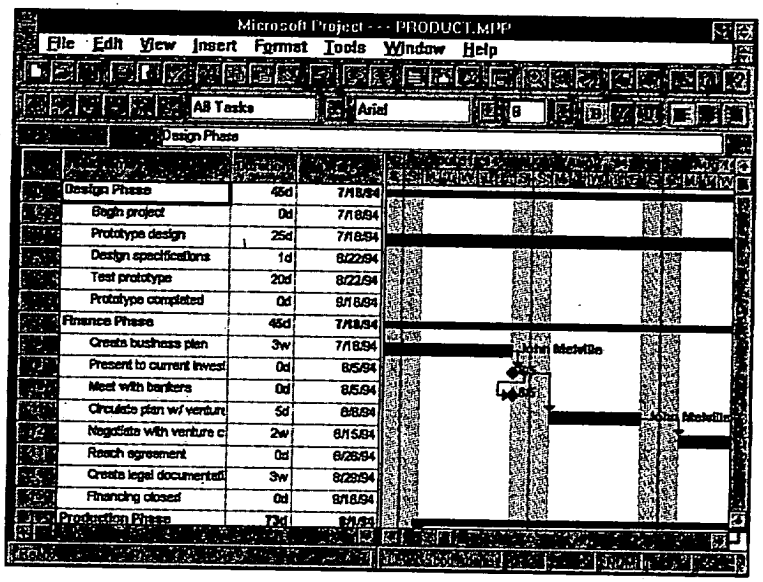

Fig 4.1
The Gantt Chart view of the PRODUCT project.

In the early 19th century, Henry Gantt popularized a modeling technique now known as the Gantt Chart. The Gantt Chart displays a spreadsheet table on the left side of the screen and a timescale with a bar chart on the right side of the screen for showing task dates and durations. The spreadsheet table is ideal for creating and editing the task list. The bar chart shows graphically the duration of each task and the chart's temporal relationship to other tasks. In addition, the bar chart shows the resources assigned to each task at the end of the task bar. The link between two tasks is graphically illustrated by an

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arrow drawn between the tasks. (See Chapter 5, "Entering Schedule Requirements," for more details on linking tasks.) The timescale shows a vertical dashed line as an indicator of today's date, unless you disable this feature.

Note

You can access other views and commands available for entering greater detail about a particular task. Several of these options are discussed later in this chapter.

You can enter a maximum of 9,999 tasks in a single project, and 9,999 rows are available in the task table. If you want to visually separate groups of tasks, you may leave blank rows in the task list. The ID numbers at the left of the table are record numbers in the database that Microsoft Project uses for storing your project details. If you move a task to another location in the list, the task takes on the ID number of the new location. You usually use the current ID number to refer to a task because you are permitted to create duplicate task names in the task list. The task ID number, not the task name, identifies each task uniquely.

The spreadsheet table on the left of the Gantt Chart view contains more columns than just the ID, Name, and Duration fields that you initially see. The other columns (Scheduled Start, Scheduled Finish, Predecessors, and Resource Names) are hidden behind the timescale chart but can be scrolled into view with the arrow keys or with the scroll bar beneath the columns. You also can move the divider bar between the spreadsheet columns and the timescale to display more columns or more timescale.

▶ "Working with the PERT Chart," p. 165.

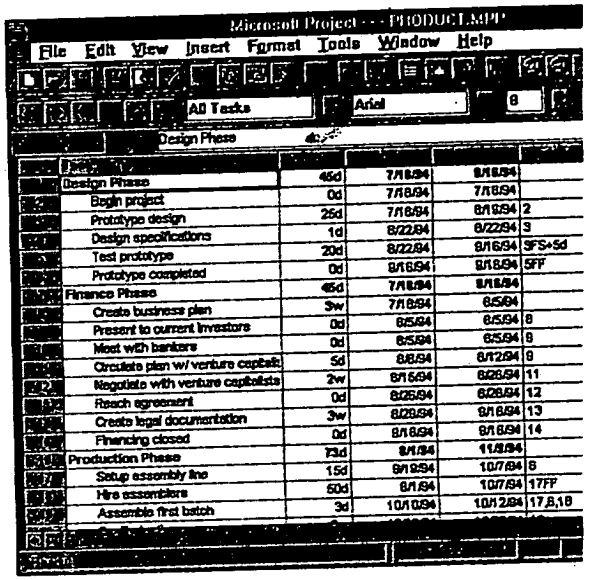
The Task Sheet view is a spreadsheet table view without the timescale and bar chart of the Gantt Chart view (see fig. 4.2). The default display contains the same columns as the Gantt Chart. Without the timescale on-screen, you can see all the columns at the same time.

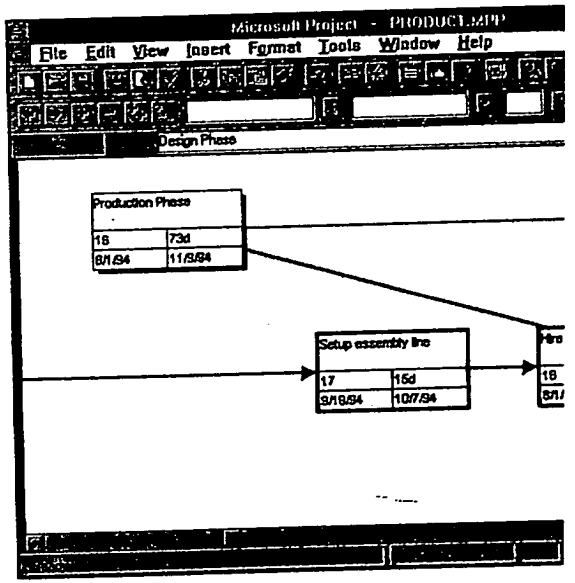
You also can use the Program Evaluation and Review Technique (PERT) Chart view to enter and edit tasks (see fig. 4.3). Each task is represented on the PERT Chart by a box or node, and a line is drawn from each predecessor task to its successor.

Entering Tasks in the Gantt Chart

Create a task by typing a task name in one of the rows of the spreadsheet table of the Gantt Chart view. As soon as you enter the task name, Microsoft Project supplies a default duration for the new task in the Duration field, and

displays a task bar under the timescale in the Gantt Char you define a different start or finish date in the Summary start date of the project is today's date.





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ee Chapter 5, "Entering Schedule Require-
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in one of the rows of the spreadsheet
ɔon as you enter the task name, Microsoft
ɔor the new task in the Duration field, and

displays a task bar under the timescale in the Gantt Chart to the right. Unless you define a different start or finish date in the Summary Info dialog box, the start date of the project is today's date.

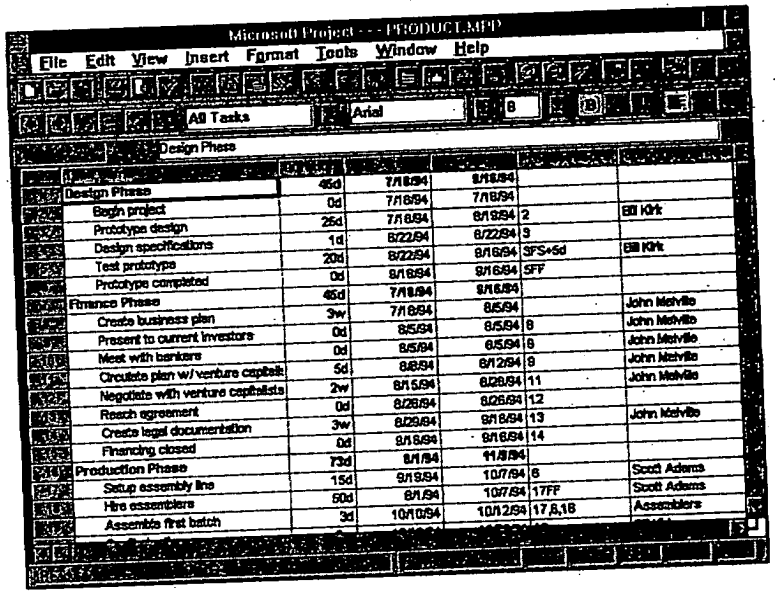

Fig. 4.2
A Task Sheet view of the SAMPLE project.

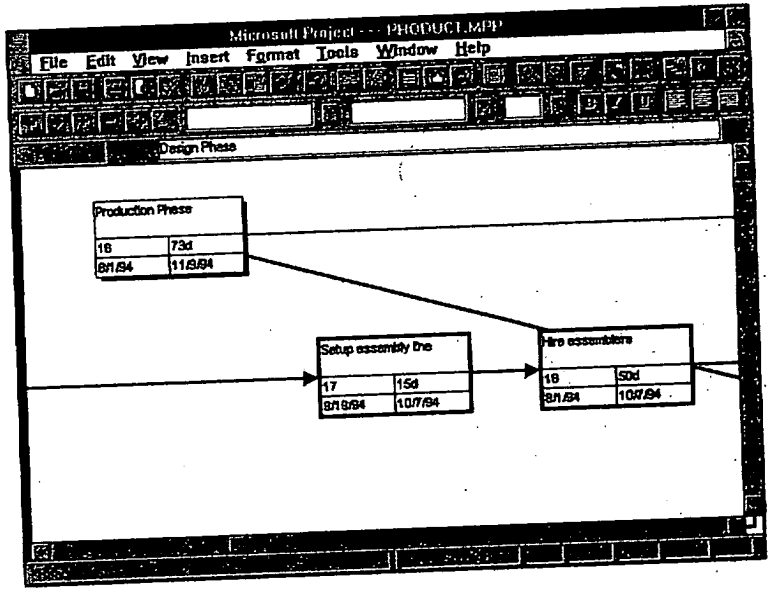

Fig. 4.3
A PERT Chart view of the SAMPLE project.

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To enter a task name, perform the following steps:

1. Select a cell in the Name column.
2. Type the task name, using any combination of keyboard characters and spaces. Task names can contain up to 255 characters. Task names do not have to be unique; you can use the same name for multiple tasks in the same project.
3. Complete the cell entry by pressing Enter, by clicking the Enter button in the entry bar, or by selecting another cell. You can cancel the cell entry by pressing the Esc key or by clicking the Cancel button in the entry bar. The field will revert to its former contents.

Note

If you first select a range of cells, you can type the list of task names without selecting each new cell. The cell selector moves down to the next row as you press the Enter key after you type each task name.

Adjusting the Column Widths in the Gantt Chart

If the task name is too long to see in the Name column, you can adjust the width of the column. To change the width of a column, follow these steps:

1. Move the mouse into the column headings for the spreadsheet table. To widen the Name field, move to the column divider line between the headings Name and Duration.
2. Drag the column border to the right or left to suit your needs.
3. Release the mouse.

You also can tell Microsoft Project to calculate the widest entry in the column and adjust the column to a best fit for the data that you entered. To adjust the column width to the best fit, perform the following steps:

1. Move the mouse pointer over the divider line to the right of the column heading for the column you want to adjust.
2. Double-click the divider line, and the column adjusts.

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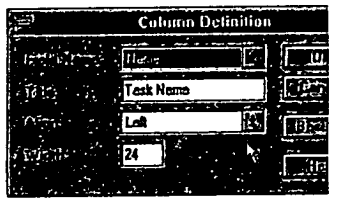
Note

If your placement of the mouse pointer is not exactly on t
clicking the mouse activates the Column Definition dialog
You can select the Best Fit button to have Project adjust t
can type a specific column width.



Adjusting the Height of Task Rows

For long task names, you may want to use two or m
name. Task names are word-wrapped by Project if e
and available for displaying task names. Figure 4.5 s
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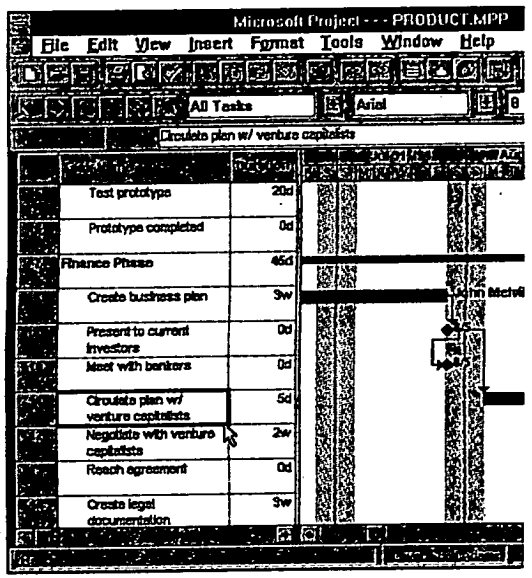

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fit, perform the following steps:

: over the divider line to the right of the
column you want to adjust.

line, and the column adjusts.

Note

If your placement of the mouse pointer is not exactly on the divider line, double-clicking the mouse activates the Column Definition dialog box (shown in fig. 4.4). You can select the Best Fit button to have Project adjust the column width. You also can type a specific column width.

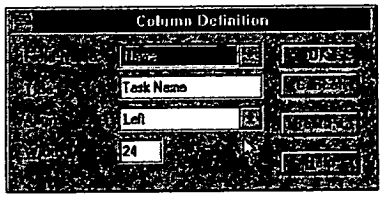

Fig. 4.4
The Column Definition dialog box.

Adjusting the Height of Task Rows

For long task names, you may want to use two or more lines for each task name. Task names are word-wrapped by Project if extra lines are both needed and available for displaying task names. Figure 4.5 shows word-wrapped task names.

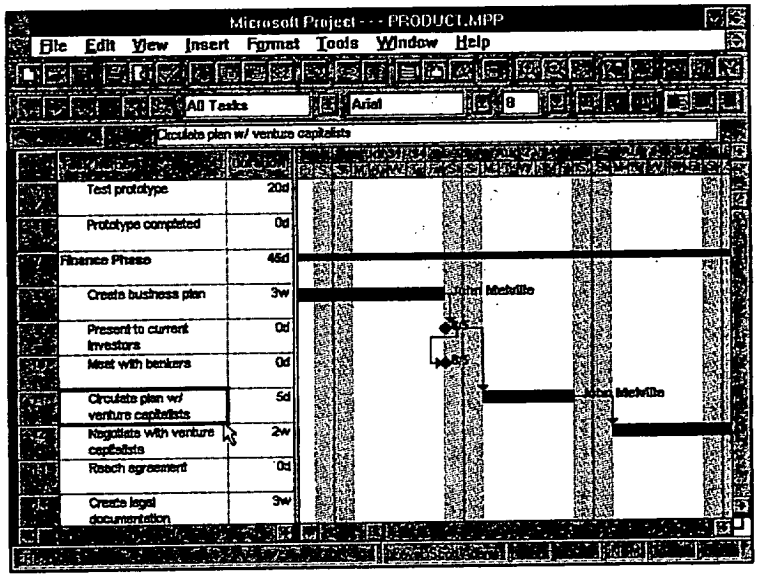

Fig. 4.5
Using two rows for the Task Names field in the Gantt Chart.

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5. Define the length of the recurring task by defining the dates in which it should continue or by specifying the number of times it will occur.

6. Click OK or press Enter to complete the task entry.

Once entered, the recurring task is placed in the task list as a summary task, with the duration of the task being the total duration of the recurring task. The task bars for the recurring task are also placed in the timeline on the appropriate dates (see fig. 4.10).

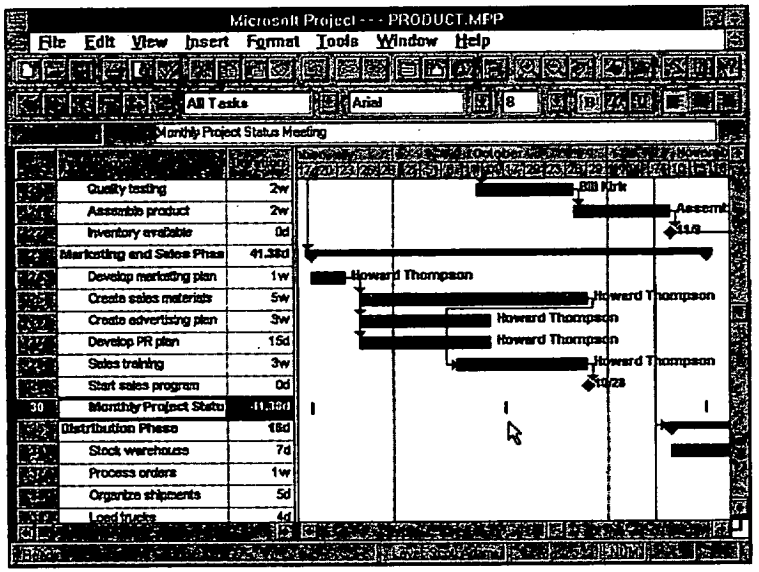


Fig. 4.10
A recurring task item in the task list.

Editing the Task List

You can edit the list of task names and task durations in several views. The Gantt Chart and Task Sheet, either with or without the Task Form in the bottom pane, are probably the most useful views for organizing the tasks into an orderly list or into an outline.

Undoing Changes in the Task List

While you're revising the list, you can undo nearly any change made in the task list with the **Undo** command in the **Edit** menu. Only the most recent change, however, can be undone. Most of the time you also can Redo (restore) the last change just undone, and when this is the case, the **Undo** command will be replaced by the **Redo** command on the **Edit** menu.

To undo or redo a change, perform the following steps

1. Select **Undo** from the **Edit** menu or press the Ctr reverse the most recent change in the project (if

2. Select **Edit Redo** to reverse the Undo that you ju

Inserting, Clearing, and Deleting Tasks

As you revise a project, you will need to be able to inse tasks from the task list.

To insert a task between other tasks, select a cell in the to insert the new task. If you want to insert several tasl extend the selection to include the requisite number o of the tasks included in the selection are shifted down blank rows. Select the **Insert Insert Task** command or You also can use the shortcut key Ctrl++ (the plus key pad) to insert rows.

Deleting a task is different from clearing the data from the task. The **Edit Clear** command merely erases the cc cells, but does not delete the remaining task details. Tl command deletes all details about the selected task(s). shortcut for the Delete Task command.

The **Edit Clear** command gives you several choices for of the selected cell. You may choose to clear the **Forma Contents**, the **Notes**, or **All** of the selected cell. The **En** clear all of the cells for the task, but does not delete th

To clear only the active cell while many cells are select ing steps:

1. Select the cells.

2. Use the Enter key or the Tab key (or their Shift cc the cell you want to clear the active cell.

3. Press Ctrl+Backspace. This clears the active cell ar area of the entry bar so that, if you want, you car entry.

4. Type a replacement entry for the active cell if des

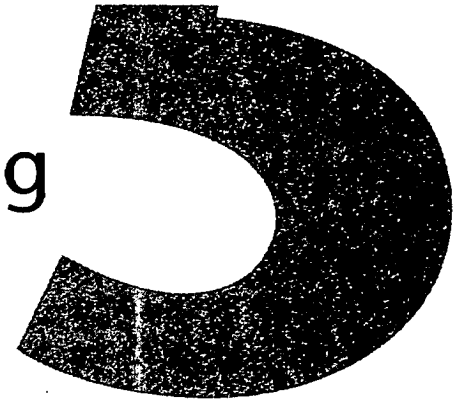
5. Press Enter or Tab to activate another cell withou

; Views and Reports," discusses in depth the vari-
; that can be used to produce professional reports
g.

ing Views," covers the various ways you can for-
dard or customized views. Some topics discussed
ıe text display, formatting timescales, and specific
:s for the commonly used standard views.

Chapter 5

Entering Scheduling Requirements



Once the project tasks have been defined and entered, the scheduling portion of project management becomes important. Up to this point, we have used Microsoft Project as a basic word processor—entering tasks and their durations into one of the various task sheets and forms available. In this chapter, we take a look at how these tasks can be sequenced and linked, thus providing a calculated preliminary schedule.

The sequencing and linking of tasks in the schedule is based on several factors. One group of factors is the internal or external constraints that limit when the task can be scheduled for completion. Another important set of factors are the scheduling requirements that link the scheduled start or finish of the task to the start or finish of other tasks.

In this chapter, the discussion focuses on

- Understanding and creating task constraints.
- Understanding the task dependencies.
- Defining and establishing task links.

Entering Deadline Constraints for Tasks

When you add a task to a project, Microsoft Project marks the task as one scheduled to start as soon as possible. This means that the program considers any sequencing requirements that determine when the task's predecessors

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To remove a task constraint, perform the following steps:

1. Select the task.
2. Select either the Constraint field on the Task Details Form or the Constraint Task Type field on the Task Information Form.
3. Select As Soon As Possible from the entry list.
4. Enter the change by choosing OK or by pressing Enter.

▶ "Auditing the Task Schedule," p. 243

In this case, if you wanted to return several tasks to an unconstrained status, you could select all the tasks you plan to change, activate the form, and select As Soon As Possible from the Constraint field. When you select OK, the changes are made in all the selected tasks.

Linking Tasks in Sequence

It's difficult to imagine a project in which no sequencing requirements exist for the tasks. Invariably, one or more tasks must be scheduled based on when some predecessor task is completed or at least started. This relationship between tasks is known as a *dependency relationship* in project management: the scheduled start or finish of one task is dependent on the scheduled start or finish of another task. If a painting project calls for applying two coats of paint, for example, you should schedule the task of applying the second coat to start *after* the task of applying the first coat is completed.

The dependent task usually is known as a *successor* task, and the task upon which this task depends is its *predecessor*. This taxonomy, although useful, can be misleading. Cases occur when the dependent task must be scheduled for completion in time for its predecessor to begin! The key to understanding this paradox is to remember that the terms predecessor and successor were chosen for the most common cases, where one task does in fact precede the other in time. It's less confusing to use the terms *independent* task and *dependent* task. Remember that the point of this exercise is to identify the tasks whose scheduling should be done to coincide in some way with the scheduled start or finish of some other task or tasks.

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Often deciding which of two tasks is the predecessor and which is the successor is self-evident. Obviously, the second coat of paint is the successor task because you cannot apply the second coat until the first coat is applied. But, what if the final coat of paint is applied by an artist, and the artist is in such

painters for the first coat are relatively easy to fin
the completion of the first coat in time for the ar
schedule changes, you can reschedule the first co
can reschedule the artist to accommodate the les
make the task of applying the first coat of paint t
the scheduling accommodates the task of applyir

The decision as to which task should be the pred
pendent or successor task hinges on which task y
If you have equal scheduling control over both ta
come first the predecessor and let the later task b
cases where one task is less easily rescheduled tha
to arbitrarily make the more flexibly scheduled ta
regardless of which task actually must come first.

Dependency relationships may be defined to allo
successor task must be delayed somewhat beyond
ing the walls of a house, for example, may be the
the foundation slab. However, you may want to a
the concrete to dry and cure before the carpenter

You also can allow for lead time in cases where th
predecessor. Loading the moving van, for exampl
to packing the boxes, but you don't have to wait
packed to start loading the van. With some lead t
overlap the packing task.

Understanding the Types of Task I

Four kinds of dependency relationships exist. In e
references a date for the predecessor task, followe
dent task (see fig. 5.5). The dates are merely statec
fore, the most common dependency relationship,
predecessor task determines the start of the depen
Finish-to-Start relationship.

The four dependency relationships, and the two-l
soft Project to designate these relationships, are sl

Finish-to-Start (FS)	The finish date of the predece scheduling of the start date o cannot start a different task u ished. For example, starting t

definitions to be automatically applied regardless of the filter that may or may not be applied to the active view. Note, however, that subordinate tasks hidden by a collapsed outline at the time the report is printed are not included in a report, even though these tasks usually are selected by the defined filter. Collapsing an outline overrides the filter.

Controlling Page Breaks in a Report

You cannot put page breaks in a report, but your report will reflect page breaks inserted in your View if the report is based on that View. Insert a page break into your view with the **Insert Page Break** command. If you wish to print a draft copy of your report on as few pages as possible, you can tell Project to ignore page breaks by clearing the **Manual Page Breaks** box in the Print dialog box.

Formatting Text in a Report

Remember that you need to format the text separately for each individual report and separately from the text format showing in the current View. For example, even if summary tasks are shaded in your current Gantt view, they will not appear shaded in a task report unless you specify the shading in the Text Styles box from the Custom Report dialog box for the individual report.

Saving and Sharing Your Custom Reports

Tip
If you choose to customize a copy of the standard reports (by selecting the **Copy** button from the Custom Reports dialog box), remember to give the copy a unique name so you can copy the report to the global template without overwriting a different report of the same name.

All the reports are saved with your project file, so remember to save your file if you have customized reports—even if you have not changed your task or resource information. If you wish to make your custom reports available to all your project files or to other people sharing the same copy of Microsoft Project, you must copy these reports into the global template file, GLOBAL.MPT, with the Organizer. You can access the Organizer from the View Custom Report dialog box. All reports in the GLOBAL.MPT template file are available to all users of Microsoft Project sharing that GLOBAL.MPT file.

From Here...

The last two chapters dealt with customizing the standard views and reports that come with Microsoft Project. The next chapter shows you how to create graphs of your task and resource data to give further customized emphasis to your data.

In the following chapters, you learn h
projects that you manage with Micros

- Chapter 21, "Creating and Usin
ways in which you can customi
application window by adding a
most to the toolbars and menus
of custom forms within your pr
- Chapter 22, "Customizing Tooll
will show you how to attach yo
menu commands.
- Chapter 23, "Using Visual Basic
greater depth in macro editing,
to begin using Visual Basic for

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Product Models 2000, The Sixth Conference on Product Models
Collegium, Linköping, 7-8 November 2000

Global Product Development Supported by Groupware

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Abstract

This paper presents result from a joint product development project between Whirlpool in Sweden and China. The result seen so far indicates that implementing the product development model/process, named as C2C at Whirlpool, by focusing coordination, communication and collaboration in the product development process implemented in groupware, could be a successful way of working. Practical examples of working with NetMeeting, the groupware database and the way of handling product confidential information with Internet is also described in this paper.

C2C is the acronym for the stage gate process Whirlpool used in all new product development projects. The process has four main phases: Ideation, Conceptualization, Conversion, and Execution. Ideation is the phase, as the name indicates, where ideas for the new product are created. This phase is described more deeply in the paper.

The Conceptualization phase is characterized by the creation of several competing concepts, which are evaluated against each other. At the Concept selection milestone, one concept is created and described in all possible details. The Concept Evaluation Tollgate is the critical evaluation of the selected concept. During Conversion, all uncertainties associated with the concept are straightened out, which means that this phase is a "uncertainty reduction phase". When the project enters the Execution phase, the likely hood to realize the concept is relatively high and all detailed designs are made and manufacturing tooling are prepared.

Groupware, the real-time sharing of information globally across physical and virtual networks among groups of project members, has emerged as a powerful productivity tool and versatile application development platform for the network computing era. Its use is complemented by the continuing explosion of the World Wide Web.

The collaborative functionality of groupware is frequently the application that drives companies to extend their networks beyond a single site and outside the enterprise. This enables the creation of virtual global teams, and effectively dissolves boundaries within organizations and between companies, continents, and time zones.

With groupwares replication functions providing remote project members with current versions of documents, up-to-the minute e-mail or Internet access just a phone call away, groupware can maximize productivity for the growing population of mobile workers. Thanks to groupwares multilevel security features, such as cryptography, encryption, and digital signature, the project member can work in confidence both on-site and on the road.

This project designated as the CCC-project is supported by NUTEK. One aim of the NUTEK-project is to define a model based upon developing and making available shared understanding.

Keywords
Global product development, groupware, communication, collaboration, coordination.

1 Introduction

The competition between industries, in this case microwave ovens, has increased during the last years, newer and "better" products must be released faster and more often to the market. The importance of an efficient product development process has therefore significantly increased. Research has lead to a variety of theories and methodologies to increase the efficiency of the product development process.

The usage of computer based tools have made a great impact on the product development process. The project team could for example create the product information once and then reuse the information. It is then important to understand the existing process at the industry, in this case the C2C-process at Whirlpool globally, and how the computer based tools could support the project team.

In this paper the work of the project team is focused (Lock, 1996), see figure 1 below. The focus is based upon the activities in the project team, where two questions are central for a member of the project team:

- What activity to do?
- How to do the activity?

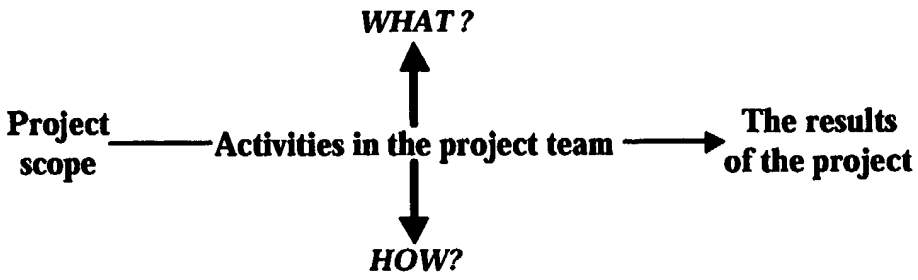

Figure 1: The activities in the project team, focusing what and how

However the computer based tools do not solve the knowledge problems in the project team. Project team members rarely give away valuable possessions like knowledge without expecting something in return (Davenport & Prusak 1998). The project teams perform to their potential only when the project members accept themselves, take responsibility for their feelings and interact constructively with other project members (Schutz, 1994). Therefore the inclusion, control and openness phases for the project team development (ibid) should coincident with the use of the computer based tools. In this paper this wider approach of computer based tools supporting the project team members globally are focused, especially the constructive interaction. This interaction is based upon coordination, communication and collaboration in the paper.

2 Research Approach

The research strategy is chosen both in line with the theoretical perspective and in line with what information will most appropriately answer the research questions. In this project an action research approached is used. Action research is a dual process, in that the researcher participates in an ongoing process and acts both as an advisor and as a researcher.

The advisor role is based upon my knowledge as a Principal Certified Lotus Professional Application Developer R4, PCLPAD R4 (Professional Services Certification, 2000). The Principal level has proven expertise in building enterprise-wide solutions to different kind of business problems. I am also trained in Fundamental Interpersonal Relations Orientation, FIRO, (Schutz, 1994). The purpose of acting as an advisor is to be able to actively participate in the development process together with the practitioners solving authentic problems, in this case with global product development. In an action research project, as the CCC-project, both the organization and the researcher are able to develop both practical and scientific knowledge (Gummesson, 1985).

3 Computer Based Tools

The Computer Based Tools should support the activities in the project team, see figure 2 next side. This support is based upon the three C:s of Workflow in groupware, which are coordination, communication and collaboration (Kern & Lynd, 2000). Coordination is the project team working together to meet the project scope and is supported by communication and collaboration. The Coordination is supported by a Lotus Notes database. In this database the project member can create for instance Minutes, Plans, Reports and Specifications. The database supports the Ideation-, Conceptualization-, Conversion- and Execution- phase in the C2C process.

Communication is different kinds of messaging, for instance face to face or by a telephone conference between members of the project team. Collaboration relies on that the project document and/or the project database is being in an area accessible to all project members. If all project members for instance have access to all the project documents, they can

all work on the documents. The communication and collaboration is supported by both Lotus Notes and Microsoft Windows NetMeeting.

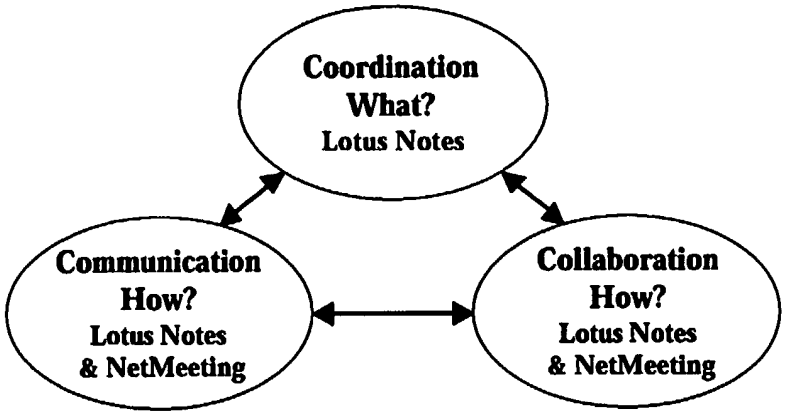

Figure 2: Computer based tools supporting the activities in the project team

3.1 Groupware – Lotus Notes and Domino

Lotus Notes finds its roots in some of the first computer programs written at the Computer-based Education Research Laboratory (CERL), at the University of Illinois. From the beginning release Lotus Notes contained encryption, signing, and authentication using the RSA public-key technology. Notes was the first important commercial product to use RSA cryptography. Domino is the name of the server product, and was introduced in December 1996 (The History of Notes and Domino, 2000). Notes Release 4.6, which is the current version at Whirlpool was shipped in September 1997. Release 5.0.4a is the latest release in August 2000. The focus of release 4.6 was personal information integration and management of content from Notes databases, Internet mail, and the Web. The developers added for instance more Internet protocols to Notes. Release 4.6 also contained a number of enhancements for the Notes client, including:

- A new user interface metaphor called a "Portfolio" for task-oriented navigation
- Internet (POP3/SMTP) mail on the client
- Enhanced Personal Address Book to support better contact management functions and integration with core Notes features
- Notes with an Internet Explorer browser option to provide better rendering of tables and support for frames

3.2 Microsoft Windows NetMeeting

NetMeeting, in this case, for Windows NT is a product that provides a conferencing solution for the Internet and corporate Intranet (NetMeeting Home Page, 2000). Features let the project members communicate with both audio and video and collaborate virtually on any Windows-based application for instance, see figure 3.

In the CCC-project we have worked with NetMeeting release 3.01 at the end of the project. NetMeetings Program Sharing feature lets the project team to share multiple programs during the project meetings. The chat feature lets the project team to real-time conversions via text, with a number of team members. This could be used for instance as a computer based tool while the project team are brainstorming. The whiteboard lets the project team to collaborate in real time with other project members. In the project we have worked with different-colored pointers to easily differentiate the project members comments.

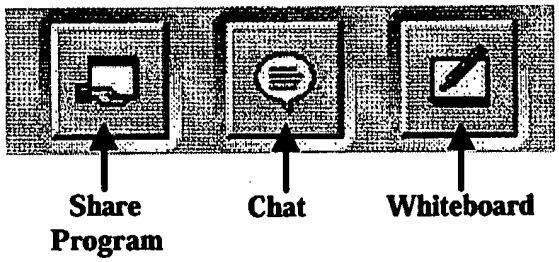

Figure 3: Parts of NetMeeting supporting communication and collaboration in the CCC-project

3.3 Technical Information

Whirlpool is using the Dynamic Host Configuration Protocol (DHCP). It is an Internet protocol for automating the configuration of computers that use TCP/IP. DHCP can be used to automatically assign IP addresses, to deliver TCP/IP stack configuration parameters such as the subnet mask and default router, and to provide other configuration information such as the addresses for printer, time and news servers. In the CCC-project we have worked with these automatically IP adresses.

The "communication way" between Sweden, Norrköping and China, to Shunde and Schenzen is:

- Norrköping to Comerio, 512/256 kb/s
- Comerio to Benton Harbor, 1544/768 kb/s
- Benton Harbor to Hong Kong, 64/32 kb/s
- Hong Kong to Shunde, 64 kb/s
- Shunde to Schenzen, 64 kb/s

In the CCC-project we have also tested a Philips Vesta Pro PC Camera (Products >> PC Camera, 2000). The results so far indicates that 64 kb/s is not good enough.

4 Project Context

Three project are described in this section. It is the:

- Product development project
- NySUM project
- CCC-project

4.1 The Product Development Project

The scope of the product development project is to develop a new microwave oven platform for the North American market with production site in China. The product is built up by 150 – 200 parts or subassemblies.

The Whirlpool C2C product development process is applied and the development environment is global with responsibility for the first phases, Ideation and Conceptualization, in Sweden. The product concept is then transferred to China for product engineering during the remaining phases; Conversion and Execution.

The formal responsibility transfer is done at the Concept Evaluation Tollgate, but in practice the transfer is to be seen as a gradual process running through the Conceptualization and Conversion phases.

The project duration from Idea Screening Tollgate to Production start is around 18 months, 6 months conceptualization, 3 months conversion and 9 months execution. The core project team size is around 10 engineers at each location. The project team meets weekly in a common phone conference and there are also other weekly sub-team and review meetings as well as numerous informal meetings. The project is reported to the steering group in a biweekly phone conference. E-mail, cc:Mail, is frequently used for communication within the project.

4.2 The NySUM Project

The NySUM project is an umbrella project funded by NUTEK from December 1st, 1997, and supported by Whirlpool and by Ericsson Utvecklings AB. The long term goal of the project is to contribute to the methodology and support system in the industrial development of complex, adequate, and reliable systems with focus on the establishment of the early shared understanding of basic concepts and system architecture and behavior (Research "NySUM", 2000).

The effort in the CCC-project will be on to introduce and evaluate new methods and support systems for the establishment of a shared early understanding within the project team and external parties of what a system should do, why, and how to achieve this. This understanding can be supported by, but never replaced by, methodology and support systems.

4.3 The CCC-project

The phases and the time span in the CCC-project are described in figure 4 on the next side. The analysis phase started with a problems and goals inventory (Goldkuhl & Röstlinger 1988). After that the problems and goals were categorized and grouped into "coordination, communication and/or collaboration lists". Then the project team made questions related to global product development. The questions were sent to a industry with a lot of experience of Lotus Notes. The project team and some other persons at Whirlpool visited the industry in the beginning of October. The industry had no experience from the "coordination, communication and collaboration approach" in the product development process. Instead the project team learned a lot about application development in Lotus Notes.

During the prototyping phase the project team were focused on coordination in the development process. The activities in the C2C-process were implemented in a Lotus Notes project database, especially the contents of the documents were focused. About twenty persons at Whirlpool were educated in how to use the project database in the product development process during a day in February. The members of the product development team tested then the project database and the way of working with NetMeeting during the usability phase. During this phase communication and collaboration was also focused.

In the beginning of April we tested the way of working between two conference rooms at Whirlpool. We used projectors in the test. In the middle of May we made the first global test. The project manager of the product development project was then in China. This was also the first test of replicating the project database to China, which was frictionless. As an example of collaboration we tested how to work with a private folder in the Lotus Notes project database.

The CCC-project has been a pilot-project, consequently the costs had to be low. The infrastructure is already available within the Whirlpool, the industry have PC's, network, Lotus Notes servers, system administrators for replication etc. Therefor the implementation costs have been limited to license costs for Lotus Notes, which are about 800 SEK per project member. Other costs are the education cost, about one day per person. Finally Microsoft Windows NetMeeting do not cost anything, it is free to download it from Internet (NetMeeting Home Page, 2000).

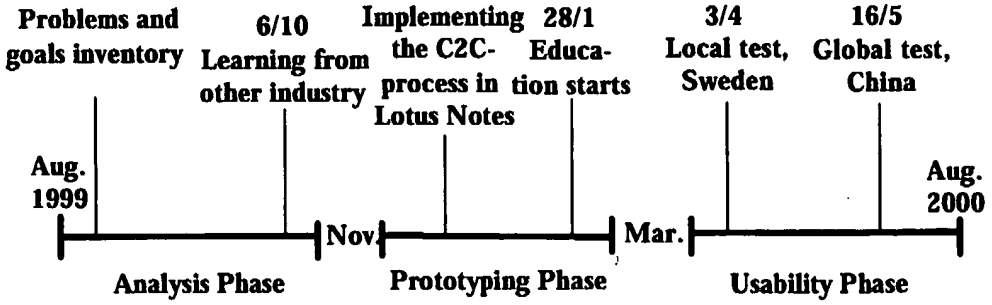

Figure 4: The phases in the CCC-project with time span

5 Result

In figure 5, the result from the CCC-project is placed together graphical. After that the result is described in different sections.

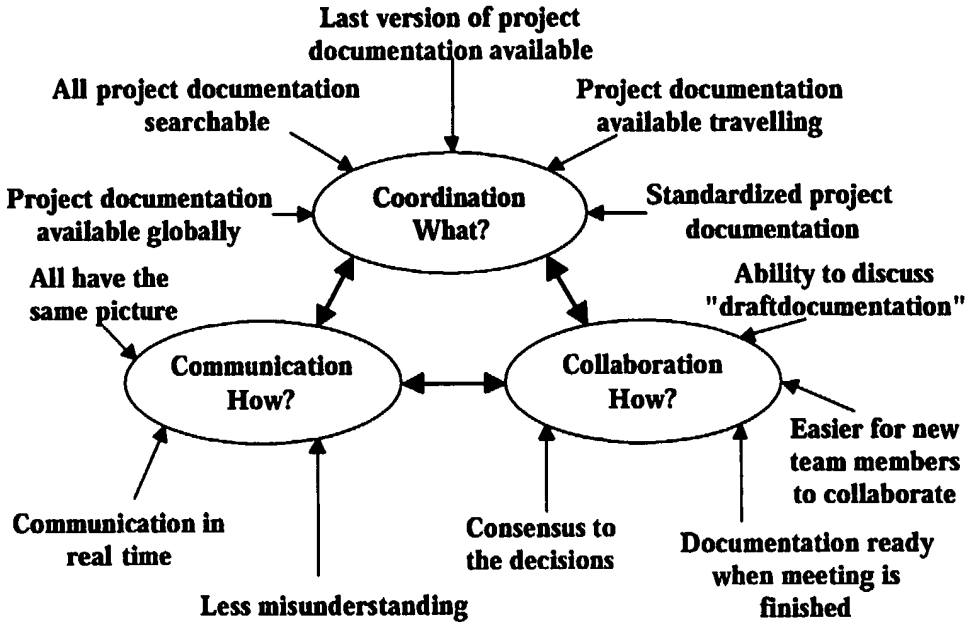

Figure 5: Placing together the result from the CCC-project graphical

5.1 Improvements - Coordination

The project documentation is available globally. One of the key features for the Lotus Notes database is that the project member can distribute copies of it to Notes clients (not Web clients) and other servers. This process is called replication, Notes clients and servers keep the information synchronized. The Lotus Notes project database is then available at all sites where it is replicated. It is replicated every 24 hour.

All project documentation is searchable. Full-text index is a collection of files that indexes the text in a database to allow Notes to process the project members search queries. With the full-text index it is easy to search specific project information as project documents and attachments. A project member can search a database whether or not it is full

text-indexed. However, if the database does contain a full text index the search will be much quicker for the project member.

Last version of project documentation is available. Version tracking allows the project member to maintain a history of changes to a document. Version tracking is active only for documents that the project member create by using the designated version tracking form. The project member have three major choices about how new versions appear in a view. The choices are new versions become responses, prior versions become responses and new version become siblings.

The project documentation is available while travelling. A replica copy of the project database is a special type of copy. Every Lotus Notes database has a replica ID that identifies it to Notes clients and Domino servers. When two databases have the same replica ID, they are replica copies. By using remote access, the project member can work directly on a clients server from office or from the home office. The project member can also work at home or on the aircraft with a portable computer. When the project member provide local security for a replicated database, Notes encrypts the database using the public key of a designated ID. Only a project member with the corresponding key can then decrypt the database. In the CCC-project we have not used the encryption feature on the project database.

Standardized project documentation, for the project team. A 32-character combination of letters and numbers uniquely identifies a project document across all replicas of a database. Two documents are replicas of one another if they share the same unique ID. In the CCC-project we have worked with the Specification documents, report number. This has helped to drive use of a common report number structure globally.

5.2 Improvements - Communication

All have the same picture in the project team. The team members can have the same picture while using projectors. This projector supports a big picture in every conference room, at every location, where it is used.

Communication in real time. By combining the features in NetMeeting with phone conferences, the project team can communicate in real time. A member of the project team can communicate both visual and

with audiovisual aids, by the Chat and Whiteboard feature in NetMeeting. Face to face communication with computer tools are not yet supported due to network transmission limitations.

Less misunderstanding in the project team. There are different pointers in NetMeeting, while working with the Share program feature, which the project members can communicate with. This creates more efficient phone conferences/meetings with less misunderstandings by use of NetMeeting globally and/or projector locally.

5.3 Improvements - Collaboration

Ability to discuss "draftdocumentation" in the project team. The project members can have private folders in the project database. Folders let the project member to store and manage related project documents without putting them into a category. The project member can keep a folder personal, or share it with other project members during a project meeting. No one else can read or delete the project members personal folders. To create personal folders in a database, the project member must have at least Reader access to the project database.

Easier for new team members to collaborate. All project history and documentation easy available in a database facilitates the concept transfer, makes it also easier for new team members to come up to speed.

Documentation ready when meeting is finished. The project team can update the product documentation, during the project meeting. Type of meetings and documents where this has been applied with good results are for instance, Specification review and sign-off, Tollgate meetings, Review of project progress in time schedules and check lists and Design review on 3D CAD-models (only locally, too big application for the network).

Consensus to decisions in the project team. All project members make changes and updates to the document in real time – consensus to the decisions and documentation ready when meeting is finished.

6 Related Work

Twelve men and six women were interviewed during the fall 1998 within ABB, in an administrative system development project. All the project leaders and the majority of consultants in five sub-projects were interviewed. There were several new employees, persons with a long period of employment within the industry, and both Swedish and foreign consultants among those interviewed, all with different project positions and with different work content from four locations in Sweden. The aim in choosing the interviewees was to obtain a representative selection of interviewees from different phases and positions in the system development project. The project leaders have selected the majority of the persons interviewed.

The aim with the project within ABB was to describe what a company-adapted system development model ought to contain. The content is based on the requirements of the system development project, and this approach constitutes a new, wider perspective of what a system development model should contain. It takes into consideration knowledge, training, model, method, communication, and decisions, all as carriers of shared understanding (Cederling, Ekinge, Lennartsson, Taxén & Wedlund, 2000). Earlier I have focused what a system development model would contain, and how to create it (Wedlund, 1997). Other related work for virtual/global development, focusing the development tools are, for instance:

- ClearCase (Project Implementation Framework, 2000)
- Infoimage (InfoImage, 2000)
- TeamRoom (TeamRoom Report, 2000)
- Quickplace (QuickPlace, 2000)

Related reports for working with information management virtual/global are, for instance done by Ericsson (Taxén, 1998), Daimler-Chrysler (DaimlerChrysler's Goal for Domino, 2000) and by United Nations (Lotus Technology Helps UN Global Compact Get the Right Balance, 2000).

7 Conclusion

The use of computer based tools to gather knowledge from different development projects globally should be a high priority for the industries. Therefore, it is useful to become familiar with and utilize groupware that can be employed to manage project team processes and project team learning in areas such as project planning, product development and project meetings (Marquardt, 1996). The question is how to start working with the computer based tools.

This paper suggests that the industries should start analyzing fundamental human elements as, how to coordinate the project activity among other activities in the project scope globally and how human being should communicate and collaborate with each other. After that the development with the computer based tools could start. Groupware is then a natural choice to support the project team. Finally new technique as for instance projectors and PC Cameras would be introduced in the product development process.

7.1 Future Research and Opportunities

Some future opportunities are listed below:

- Migrate the working methods and tools to other projects and locations
- Common project activity list in Lotus Notes with definition of activity, responsible, due time and log on taken actions
- Implementation of Lotus Mail
- Reduced need for travels since efficient communication can be maintained between the physical meetings.
- Definition of work flows in Lotus Notes, e.g. for tollgate reviews and signoffs
- Real time review of 3D CAD-models in NetMeeting. Not possible today due to network transmission limitations

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